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REPORT
99-54

DEPARTMENT OF ENERGY CIVILIAN RESEARCH AND DEVELOPMENT AUTHORIZATION ACT FOR FISCAL YEARS 1986, 1987, AND 1988

APRIL 22, 1985.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

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Mr. FUQUA, from the Committee on Science and Technology, submitted the following

REPORT

together with

ADDITIONAL AND DISSENTING VIEWS

[To accompany H.R. 1798]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science and Technology, to whom was referred the bill (H.R. 1798) to authorize appropriations to the Department of Energy for civilian research and development programs for the fiscal years 1986, 1987, and 1988 and for the continuation in those fiscal years of prior year research and development projects, having considered the same, report favorably thereon with amendments and recommend that the bill as amended do pass.

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The amendments are as follows:

On page 2, line 5, strike "$150,375,000" and insert in lieu thereof "$149,375,000"; and on page 2, line 7, strike "$141,650,000" and insert in lieu thereof "$142,650,000".

On page 11, lines 23 and 24, strike "$8,250,000" and "$482,050,000" and insert in lieu thereof "$9,000,000" and "$481,300,000" respectively.

On page 20, line 4, insert the following "(3) Project numbered 86-R-104, Central computing upgrade, Fermi National Accelerator Laboratory, Batavia, Illinois, $2,800,000 for a total authorization of $23,900,000;" and renumber the succeeding paragraphs accordingly; and on page 20, line 10, strike, "$3,700,000" and insert in lieu thereof "$3,900,000."

On page 21, line 11, SEC. 303., strike everything after the period following 303 and insert the following:

> "Within ninety days of the enactment of this act the Secretary of Energy shall review those recommendations of the President's Private Sector Survey on Cost Control and such other recommendations as may be included in the OMB report "Management of the United States Government—1986" and shall submit a report to the Speaker of the House of Representatives and the appropriate Committees of the House and Senate on the implementation status of each such recommendation which affects the Department of Energy and which is within the authority and control of the Secretary for certain research and development programs.".

I. BACKGROUND OF THE BILL

The fiscal year 1986 Department of Energy budget was submitted to the House of Representatives on February 4, 1985 by President Reagan.

On March 28, 1985, Chairman Don Fuqua introduced a bill, H.R. 1798, to authorize appropriations to the Department of Energy for civilian research and development programs and projects for fiscal years 1986, 1987 and 1988. This bill was referred to the Committee on Science and Technology.

Extensive hearings were held during February and March 1985 on the Department of Energy authorization requests. On April 2, 1985, the Committee met to mark up the bill. After completing this action, the Committee reported the bill, H.R. 1798, as amended, on April 2, 1985 by a voice vote.

II. HEARINGS

A. Subcommittee on Energy Development and Applications

The Subcommittee on Energy Development and Applications held hearings on the fiscal year 1986 Department of Energy (DOE) authorization for fossil energy, energy conservation, solar energy, geothermal energy, supporting research and technical analysis, and general science and research programs on February 28, March 5, 6 and 7, 1985.

DOE officials who testified included: Dr. Alvin W. Trivelpiece, Director of the Office of Energy Research, accompanied by Dr. Donald K. Stevens, Acting Associate Director of the Office of Basic Energy Sciences and Dr. James E. Leiss, Associate Director of the Office of High Energy and Nuclear Physics; Hon. William Patrick Collins, Under Secretary of Energy, accompanied by Ms. Donna R. Fitzpatrick, Principal Deputy Assistant Secretary for Conservation and Renewable Energy, Mr. Alan J. Streb, Deputy Assistant Secretary for Conservation, and Dr. Robert San Martin, Deputy Assistant Secretary for Renewable Energy; and Hon. William A. Vaughn, Assistant Secretary for Fossil Energy, accompanied by Mr. Donald L. Bauer, Principal Deputy Assistant Secretary for Fossil Energy, and Mr. Jeremiah E. Walsh, Jr., Deputy Assistant Secretary for Management, Planning, and Technical Coordination.

In addition, the following citizens testified: Professor George C. Pimentel of the Department of Chemistry at the University of California, Berkeley; Professor Daniel Kleppner of the Massachusetts Institute of Technology; Dr. Frederick Seitz of Rockefeller University; Dr. Alan Schriesheim, Director of Argonne National Laboratory: Dr. David A. Shirley, Director of Lawrence Berkeley Laboratory; Dr. Herman Postma, Director of Oak Ridge National Laboratory; Dr. John P. Schiffer of Argonne National Laboratory and University of Chicago; Professor Maury Tigner, Director of the Universities Research Association Superconducting Super Collider Central Design Group; Dr. Leon M. Lederman, Director of Fermi National Accelerator Laboratory; Dr. Burton Richter, Director of the Stanford Linear Accelerator Center; Dr. Nicholas P. Samios, Director of Brookhaven National Laboratory; Dr. H. M. Hubbard, Director of the Solar Energy Research Institute; Professor Henry Ehrenreich of Harvard University; Mr. Mark W. Anderson, Photovoltaics Project Manager for the Sacramento Municipal Utility District; Dr. Donald Klass, President of the Biomass Energy Research Association, Dr. Michael E. Berger, Deputy Associate Director of Alterna-

tive Energy Sources for Los Alamos National Laboratory; Dr. Peter D. Blair, Project Director of the Energy and Materials Program for the Office of Technology Assessment; Mr. Stephen Wiel, Commissioner of the Public Service Commission of Nevada; Mr. Scott Sklar, Director of Government Relations for the Solar Energy Industries Association; Mr. David O. Webb, Senior Vice President for Policy and Regulatory Affairs of the Gas Research Institute; Mr. Gene Mannella, Deputy Director of the Washington Office of the Electric Power Research Institute, Mr. Michael Baly III, Vice President of Government Relations of the American Gas Association; Mr. Joseph A. McElwain, Chairman of the Board of the MHD Development Corporation; Mr. Robert W. Fri, Advisor to the Board of the Fuel Cell Users Group of the Electric Utility Industry, Inc.; Dr. Peter R. Solomon, Chairman of the Division of Fuel Chemistry of the American Chemical Society; Mr. S. R. Hart, Jr., Vice President of Research and Development for the Southern Company Services, Inc.; Mr. Orin F. Zimmerman, Technical Director of Energy Utilization for the Electric Power Research Institute; Mr. Frank M. Coda, Executive Director-Secretary for the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE); Mr. Thomas Vonier for the American Institute of Architects; Mr. Jean-Louis Poirier, Manager at Hagler, Bailly & Company; Dr. Edward Kelleher, Vice President for Technology for the Champion International, Inc.; Dr. James H. Leonard, Vice President for Technology for the Bethlehem Steel Corporation; and Professor John F. Elliot of the Massachusetts Institute of Technology.

B. Subcommittee on Natural Resources, Agriculture Research and Environment

The Subcommittee on Natural Resources, Agriculture Research and Environment held hearings on the Department of Energy's fiscal year 1986 budget request for environmental programs on March 20 and 26, 1985.

Testimony was received from: Henry Wagner, Director, Division of Nuclear Medicine, Johns Hopkins Medical Institution, and a member of the Health and Environmental Research Advisory Committee, Office of Energy Research, Department of Energy; Dr. T. F. Budinger, Lawrence Berkeley Laboratory, University of California, accompanied by Mrs. Quereda Berry, patient, treated by heavy ion therapy; Dr. David Kuhl, Department of Radiological Sciences, University of California Medical Center; and Alfred P. Wolf, Chairman, Chemistry Department, Brookhaven National Laboratory.

DOE officials who testified on March 26 included: Dr. Alvin Trivelpiece, Director, Office of Energy Research, and Mr. William A. Vaughan, Assistant Secretary for Fossil Energy, Acting Assistant Secretary for Policy, Safety, and Environment, Department of Energy.

C. Subcommittee on Energy Research and Production

The Subcommittee on Energy Research and Production held hearings on the fiscal year 1986 Department of Energy budget request for the Nuclear Fission R&D program, including an overview of the program and discussions on the Civilian Reactor Develop-

ment and Advanced Nuclear Systems programs; Nuclear Waste Management, including discussions on the Nuclear Waste Fund, Civilian R&D, Waste Technology and Remedial Actions; Uranium Enrichment Activities; Electric Energy Systems, Energy Storage Systems, and Small-Scale Hydroelectric Systems; and Magnetic Fusion Energy. The hearings were held on February 20, 21, 26, and 28, March 4, 5, 7, 8, and 18, 1985.

DOE officials who testified included: Mr. James Vaughan, Acting Assistant Secretary for Nuclear Energy; Dr. Lyle Wilcox, Deputy Assistant Secretary for Breeder Reactor Programs; Mr. Ben Rusche, Director, Office of Civilian Radioactive Waste; Mr. John R. Longenecker, Deputy Assistant Secretary for Uranium Enrichment; Hon. Pat Collins, Under Secretary; Mr. Al Streb, Deputy Assistant Secretary for Conservation; Dr. Robert San Martin, Deputy Assistant Secretary for Renewable Energy; Dr. Alvin W. Trivelpiece, Director, Office of Energy Research; Dr. John F. Clarke, Associate Director, Office of Fusion Energy; and Dr. Ronald Davidson, Chairman, Magnetic Fusion Advisory Committee.

In addition to DOE officials, testimony was also received from: Mr. Floyd Culler, Electric Power Research Institute; Mr. James Gallagher, Westinghouse Electric Corporation; Dr. Bertram Wolfe, General Electric Company; Mr. Jack Young, International Energy Associates Limited; Mr. Ed Kintner, GPU Nuclear Corporation; Mr. Richard Walker, Gas-Cooled Reactor Associates; Dr. Kerry Dance, GA Technologies; Mr. Warren Chernock, Combustion Engineering, Inc.; Mr. Milton Levenson, Bechtel Corporation; Mr. John E. Nolan, Hanford Engineering Development Laboratory; Dr. Charles Till, Argonne National Laboratory; Mr. G.W. Meyers, Rockwell International; Dr. Judith Ambrus, National Aeronautics and Space Administration; Dr. Vincent Truscello, Jet Propulsion Laboratory; Dr. Glenn F. Knoll, University of Michigan; Mr. Clive Whittenbury, Member, Tri-Committee Advisory Panel; Dr. John L. Emmett, Associate Director, Lawrence Livermore National Laboratory; Mr. George R. Jasny, Martin Marietta Energy Systems Group, Inc.; Mr. Kenneth W. Sommerfeld, Martin Marietta Energy Systems Group, Inc.; Mr. Richard L. Grant, Boeing Engineering Company Southeast, Inc.; Mr. Norman Whitchurch, Goodyear Aerospace Corporation; Mr. Charles J. Rowan, Airesearch Manufacturing Company; Dr. George Cunningham, Director of MITRE Institute, MITRE Corporation; Mr. Arthur Lundvall, Baltimore Gas and Electric Company, representing Edison Electric Institute; Mr. Bill Stevens, Chairman, Uranium Policy Council, American Mining Congress; Mr. John Davis, Director, Office of Nuclear Material, Safety and Safeguards, U.S. Nuclear Regulatory Commission; Mr. William W. Berry, Virginia Power Company; Mr. Robert N. Broadbent, Assistant Secretary for Water and Science, U.S. Department of Interior; Mr. Sheldon Meyers, Acting Director, Office of Radiation Programs, U.S. Environmental Protection Agency; Mr. Charles Lawrence, Institute of Electrical and Electronics Engineers, Inc.; Mr. Lowell J. Endahl, National Rural Electric Cooperative Association; Mr. Gene Mannella, Electric Power Research Institute; Dr. Elton J. Cairns, Lawrence Berkeley Laboratory; Mr. Roger Carlsmith, Oak Ridge National Laboratory; Hon. Mike McCormack, Consultant; Hon. Fortney H. (Pete) Stark (D-CA),

Member of Congress; Dr. Ronald Parker, Massachusetts Institute of Technology; Dr. Tihiro Ohkawa, GA Technologies, Inc.; Mr. Leonard F.C. Reichle, EBASCO Services, Inc.; representing the Magnetic Fusion Advisory Panel; Dr. Stephen O. Dean, Fusion Power Associates; Mr. Joe Gavin, Grumman Aerospace Corporation, representing the Committee on International Cooperation in Magnetic Fusion, National Research Council; Dr. Allan Mense, representing Institute of Electrical and Electronics Engineers, Inc.; Dr. Peter Staudhammer, TRW; and Mr. Paul M. Koloc, Prometheus.

D. Subcommittee on Transportation, Aviation and Materials

The Subcommittee on Transportation, Aviation and Materials held a budget authorization hearing on February 27, 1985 on the Department of Energy's Transportation R&D Programs.

Witnesses included:

Mr. Pat Collins, Under Secretary, U.S. Department of Energy; accompanied by: Miss Donna R. Fitzpatrick, Principal Deputy Assistant Secretary for Conservation and Renewable Energy; Mr. Al Streb, Deputy Assistant Secretary for Conservation; and Mr. Mel Chiogioji, Director, Office of Vehicle and Engine R&D.

Mr. Noel P. Nightingale, Program Manager, Automotive Stirling Engine Development Program, Mechanical Technology, Inc., Latham, New York; accompanied by Mr. Bruce Goldwater, General Manager, Stirling Engine Systems Division.

Mr. John Boppart, Vice President, Engineering, Garrett Turbine Engine Company, The Garrett Corporation, Washington, D.C.

Dr. Ian Macpherson, Director, Powertrain Research, Ford Motor Company, Dearborn, Michigan.

Mr. Harold E. Helms, Chief Project Engineer for Vehicle Turbines, Allison Division, General Motors Corporation.

Mr. Ray Hudson, Manager, Thermal Research and Development, Electronics Division, Eagle-Picher Industries, Inc., Joplin, Missouri.

III. SUMMARY OF COMMITTEE ACTIONS

Committee Amendments

Explanation of Amendments—H.R. 1798

(1) The first amendment transfers the building systems test facility initiative from the Energy Conservation program to the Solar Buildings program in Solar Energy. This transfer more closely ties to ongoing programs.

(2) The second amendment increases the general reduction applied to the Supporting Research and Technical Analysis programs in order that the authorized total for these activities is the same as the FY 1986 request.

(3) The third amendment is a technical amendment to insert a project which was omitted when the bill was introduced and to correct an error which was made when the bill was introduced.

(4) The fourth amendment broadens the scope of the study to be conducted by the Secretary of Energy to include a review of the OMB's management report in addition to the recommendations contained in the President's Private Sector Survey on Cost Control and to apply the Secretary's study to all those civilian research and development programs which are within his authority and control.

TITLE I—FISCAL YEAR 1986 ENERGY R&D PROGRAMS

[In thousands of dollars]

	Fiscal year 1985 budget authority (estimate)	Fiscal year 1986 DOE request	Committee action	
			Changes to DOE request	Total authorization
Fossil energy:				
Operating expenses	337,719	235,686	+80,500	316,186
Capital equipment	4,425	3,000	.....	3,000
Construction	4,916	3,985	.....	3,985
Total, fossil energy	347,060	242,671	+80,500	323,171
Energy conservation:				
Operating expenses	132,943	123,875	+25,500	149,375
Capital equipment	7,987	3,200	.....	3,200
Construction	6,469	2,700	.....	2,700
Total, conservation	147,399	129,775	+25,500	155,275
Energy supply R&D:				
Solar energy:				
Operating expenses	159,111	139,150	+3,500	142,650
Capital equipment	2,900	3,711	.....	3,711
Construction	9,500	2,071	.....	2,071
Total, solar energy	171,511	144,932	+3,500	148,432
Geothermal energy:				
Operating expenses	31,444	24,700	.....	24,700
Capital equipment	400	500	.....	500
Total, geothermal	31,844	25,200	.....	25,200
Nuclear fission (supply R&D):				
Operating expenses	426,008	396,375	+39,115	435,490
Capital equipment	22,565	17,250	.....	17,250

[In thousands of dollars]

	Fiscal year 1985 budget authority (estimate)	Fiscal year 1986 DOE request	Committee action	
			Changes to DOE request	Total authorization
Construction	7,800	5,700	.....	5,700
Total, nuclear fission supply R&D	456,373	419,325	+39,115	458,440
Magnetic fusion energy:				
Operating expenses	374,299	346,400	+25,000	371,400
Capital equipment	30,170	30,450	.....	30,450
Construction	32,500	13,150	.....	13,150
Total, Magnetic Fusion	436,969	390,000	+25,000	415,000
Electric energy systems and energy storage systems:				
Operating expenses	39,312	25,900	+10,113	36,013
Capital equipment	800	200	+600	800
Total, EES/ESS	40,112	26,100	+10,713	36,813
Supporting research and technical analysis:				
Operating expenses	364,024	376,381	+8,500	384,881
Capital equipment	31,120	31,494	.....	31,494
Construction	83,170	73,425	+500	73,925
Subtotal	478,314	481,300	+9,000	490,300
General reduction	.....	.....	−9,000	−9,000
Total, supporting research	478,314	481,300	0	481,300
Environmental R&D:				
Operating expenses	218,748	215,116	+4,000	219,116
Capital equipment	9,436	9,250	.....	9,250
Construction	3,000	3,250	.....	3,250
Total, environmental R&D	231,184	227,616	+4,000	231,616
Geothermal resources development fund: Operating expenses, total	121	72	.....	72
General science and research:				
Operating expenses	521,967	545,800	.....	545,800
Capital equipment	71,400	77,100	+10,000	87,100
Construction	137,300	62,500	.....	62,500
Subtotal	730,667	685,400	+10,000	695,400
General reduction	.....	.....	−10,000	−10,000
Total, general science	730,667	685,400	.....	685,400
Nuclear fission (uranium enrichment R&D):				
Operating expenses	150,800	150,000	.....	150,000
Capital equipment	8,700	.....	.....	.....
Construction	500	.....	.....	.....
Total, uranium enrichment R&D	160,000	150,000	.....	150,000
Total, title I:				
Operating	.....	.....	.....	2,775,683
Capital equipment	.....	.....	.....	186,755
Construction	.....	.....	.....	167,281
Total	.....	.....	.....	3,129,719
General reductions (sec. 106)	.....	.....	.....	−19,000
Total authorization, title I	3,231,554	2,922,391	+188,328	3,110,719

TITLE II—FISCAL YEARS 1987 AND 1988 ENERGY R&D PROGRAMS

[In thousands of dollars]

	Fiscal year 1986 DOE request	Fiscal year 1986 Committee action	Fiscal year 1987 Committee action	Fiscal year 1988 Committee action
Fossil energy:				
Operating and capital equipment			348,556	366,297
Construction			4,156	4,368
Total	242,671	323,171	352,712	370,665
Energy conservation:				
Operating and capital equipment			165,163	168,578
Construction			0	0
Total	129,775	155,275	165,163	168,578
Energy Supply R&D				
Solar energy:				
Operating and capital equipment			152,945	161,785
Construction			0	0
Total	144,932	148,432	152,945	161,785
Geothermal energy:				
Operating and capital equipment			26,517	28,052
Construction			0	0
Total	25,200	25,200	26,517	28,052
Nuclear fission:				
Operating and capital equipment			470,750	494,300
Construction			8,400	10,800
Total	419,325	458,440	279,150	505,100
Magnetic fusion energy:				
Operating and capital equipment			417,950	438,850
Construction			10,000	10,000
Total	390,000	415,000	427,950	448,850
Electric energy systems and energy storage systems: Operating and capital equipment	26,100	36,813	37,186	39,046
Supporting research and technical analysis:				
Operating and capital equipment			437,831	462,709
Construction			58,202	12,200
Total	481,300	481,300	496,033	474,909
Environmental R&D:				
Operating and capital equipment			239,785	251,765
Construction			3,250	3,250
Total	227,616	231,616	243,035	255,015
Subtotal, energy supply R&D:				
Operating and capital equipment			1,782,964	1,876,507
Construction			79,852	36,250
Total	1,714,473	1,796,801	1,862,816	1,912,757
Geothermal resources development fund (GRDF): Operating expenses, total	72	72	75	78

[In thousands of dollars]

	Fiscal year 1986 DOE request	Fiscal year 1986 Committee action	Fiscal year 1987 Committee action	Fiscal year 1988 Committee action
General science and research:				
Operating and capital equipment			660,061	687,887
Construction			47,500	33,900
Total	685,400	685,400	707,561	721,787
Uranium enrichment R&D:				
Operating and capital equipment			156,000	163,800
Construction			0	0
Total	150,000	150,000	156,000	163,800
Total, title II	2,922,391	3,110,719	3,244,327	3,337,665

FOSSIL ENERGY: SUMMARY OF COMMITTEE ACTIONS

The Committee recommendations authorize a total of $323,171,000 for Fossil Energy Research and Development programs, which is $80,500,000 above the Department's request.

In the specific subprograms, the Committee recommendations resulting in funding changes are as follows:

Operating expenses

1. Control technology and coal preparation.—Increase of $5,100,000 to provide: (1) an increase of $3,000,000 for Coal Preparation, including $1,500,000 for Southern Illinois University high sulfur coal research and $1,500,000 for advanced flotation studies; (2) an increase of $1,100,000 for Flue Gas Cleanup to continue the evaluation of combined NO_x/SO_x in a dry scrubber process at Argonne National Laboratory; and (3) an increase of $1,000,000 for Waste Management for coal waste processing.

2. Coal liquefaction.—Increase of $11,600,000 to provide: (1) an increase of $5,100,000 for Indirect Liquefaction to continue operation of the LaPorte, Texas liquid phase methanol pilot plant through the end of fiscal year 1986; and (2) an increase of $6,500,000 for Advanced Process Development to continue operation of the Wilsonville, Alabama two-stage liquefaction pilot plant through the end of fiscal year 1986.

3. Combustion systems.—Decrease of $12,000,000 to provide: (1) an increase of $1,000,000 for Advanced Combustion Technology for advanced slagging, pulsed combustion systems; (2) an increase of $2,000,000 for Alternative Fuels for Electric Power Research Institute/Department of Energy combustion studies; and (3) to reduce the request for the Tennessee Valley Authority demonstration plant by $15,000,000 because funds for the plant have already been appropriated.

4. Fuel cells.—Increase of $27,800,000 to provide: (1) an increase of $23,300,000 for Phosphoric Acid Systems, including $2,300,000 for continuation of the 25 kW stack, $11,000,000 for a joint development program to design, build and demonstrate two 7.5 MW proto-

type power plants, and $10,000,000 for the water-cooled stack program; (2) an increase of $3,500,000 for Molten Carbonate Systems to continue the development of the direct fuel cell; and (3) an increase of $1,000,000 for Advanced Concepts for cost-shared research on solid oxide fuel cells.

5. Heat engines.—Increase of $3,000,000 for research on coal liquid fuels for diesel locomotive engines and turbine power systems, and within available funds provide $1,000,000 for a coal-fired Stirling engine study.

6. Magnetohydrodynamics (MHD).—Increase of $28,000,000 to continue operation of two facilities and provide for development of materials and components.

7. Surface coal gasification.—Increase of $15,000,000 to provide: (1) an increase of $1,000,000 for Advanced Research aimed at bioprocessing sulfur removal; (2) an increase of $2,000,000 for Advanced Process Development for pollutant recycle studies; (3) an increase of $3,000,000 for System Engineering Concepts ash agglomerating gasifier studies; and (4) an increase of $9,000,000 for operation of the Waltz Mill, Pennsylvania facility.

8. Oil shale.—Increase of $1,000,000 for Oil Shale Technology Base for eastern oil shale gasification studies, and an increase of $1,000,000 for generic eastern oil shale studies.

ENERGY CONSERVATION: SUMMARY OF COMMITTEE ACTIONS

The Committee recommendations authorize a total of $155,275,000 for Energy Conservation programs, which is $25,500,000 above the Department's request of $129,775,000.

In the specific subprograms, the Committee recommendations resulting in funding changes are as follows:

Operating expenses

1. Building and community systems.—Increase of $4,000,000 to provide: (1) an increase of $1,000,000 for Building Systems activities, including an additional $400,000 for Building Materials Research to restore funding to the fiscal year 1985 appropriation level, and an additional $600,000 for Buildings Integration that restores funding to commercial building systems interactions; (2) $1,000,000 for Technology and Consumer Products to continue R&D on Stirling and absorption concepts for the Thermally Activated Heat Pumps activity; and (3) $2,000,000 to continue the Urban Consortium Energy Task Force. Within available funds, provide $900,000 to develop a cost-shared initiative to design, build, and scale up a photochemical mercury isotope separation process under the management of the Lawrence Berkeley Laboratory lighting research laboratory.

2. Multi-sector.—Increase of $5,000,000 to provide: (1) an increase of $6,000,000 for the Energy Conversion and Utilization Technologies (ECUT) Materials Research Project to initiate an innovative steel research program; and (2) to decrease the ECUT Biocatalysis Project by $1,000,000 in order to provide a more modest increase of 14 percent above the fiscal year 1985 appropriation.

3. Transportation.—Increase of $16,500,000 for the Stirling engine program and for the Electric Vehicle program. Reprogram approxi-

mately $2,500,000 in previously appropriated funds to the Electric Vehicle program.

SOLAR ENERGY: SUMMARY OF COMMITTEE ACTIONS

The Committee recommendations authorize a total of $148,432,000, which is $3,500,000 above the Department's request.

In the specific subprograms, the Committee recommendations resulting in funding changes are as follows:

Operating expenses

1. Solar buildings energy systems.—(1) Increase of $1,000,000 for a building systems test facility in the Southeast to address cooling issues in hot humid climates using full-scale single and multifamily prototypes; (2) redirect $700,000 from Solar Buildings Materials and Components Thin Film Flatplate Collector R&D to Solar Buildings Materials and Components Apertures R&D; and (3) within available funds, provide $900,000 for Solar Building Technology Transfer activities.

2. Photovoltaic energy systems.—Within available funds, provide $450,000 for the Photovoltaic Southwest Residential Experiment Station and $450,000 for the Photovoltaic Southwest Residential Experiment Station.

3. Solar thermal energy systems.—Increase of $1,000,000 for solar bowl studies.

4. Biofuels energy systems.—No change by (1) increasing Thermochemical Conversion by $2,100,000 to provide a medium-Btu gasification base research program of $4,000,000, and by (2) decreasing Biochemical Conversion by $2,100,000 to provide a more modest 25 percent increase above the fiscal year 1985 appropriation.

5. Ocean energy systems.—Increase of $1,500,000 to provide: (1) an additional $1,000,000 for open cycle experiments, and (2) $500,000 for initiation of a jointly funded cooperative research program in ocean energy and technology.

GEOTHERMAL ENERGY: SUMMARY OF COMMITTEE ACTIONS

The Committee recommendations authorize a total of $25,200,000 for Geothermal Energy research and development, which is the Department's request.

In the specific subprograms, the Committee recommendations resulting in funding changes are as follows:

Operating expenses

Geothermal technology.—No change, but provide: (1) an increase of $1,000,000 for Hydrothermal Research to restore Heat Cycle research, Permeability Enhancement, Materials Research, including $500,000 for the Salton Sea Scientific Drilling Project to bring total Project funding in fiscal year 1986 to $1,000,000; (2) an increase of $1,500,000 for Hard Rock Penetration Research to restore R&D activities in several cost-shared drilling projects; (3) an increase of $500,000 for Technology Transfer to continue information dissemination; and (4) a decrease of $3,000,000 to continue Magma Energy Extraction at the fiscal year 1985 appropriation level.

NUCLEAR FISSION ENERGY (SUPPLY R&D): SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $458,440,000 for the nuclear fission energy (supply R&D) program which is an increase of $39,115,000 above the Administration request.

A. Operating expenses

In the specific subprograms, the Committee acted as follows:

1. Civilian Reactor Development. Increased the Administration request by $28,115,000. The increase is to be allocated as follows:

Improved Light Water Reactor Technology—No change from Administration request.

Advanced Converter Reactor Technology—Add $24,615,000.

Advanced Breeder Reactor Technology—Add $18,500,000.

Water-Cooled Breeder Reactor Technology—Decrease Administration request by $15,000,000.

Civilian Reactor Development Program Support. No change from Administration request of $29,600,000.

2. Advanced Nuclear Systems. Increase the Administration request by $5,000,000 for a total of $38,800,000.

3. Nuclear Waste Technology. Increase the Administration request by $6,000,000 for a total of $12,000,000.

4. Civilian Radioactive Waste R&D. Agreed to the Administration request of $20,275,000.

B. Plant and capital equipment

The Committee agreed to the Administration request of $17,250,000 to be allocated as follows:

Advanced Converter Reactor Technology—$1,200,000
Advanced Breeder Reactor Technology—$8,800,000
Advanced Nuclear Systems—$3,700,000
Nuclear Waste Technology—$450,000
Civilian Radioactive Waste R&D—$3,100,000

C. Construction

The Committee agreed to the Administration request of $5,700,000 to be allocated as follows:

Advanced Converter Reactor Technology—$1,000,000
Advanced Breeder Reactor Technology—$1,800,000
Civilian Reactor Development Program Support—$900,000
Advanced Nuclear Systems—$2,000,000

MAGNETIC FUSION ENERGY: SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $415,000,000 for the Magnetic Fusion Energy Program which is an increase of $25,000,000 over the Administration request of $390,000,000. The Committee added the additional funding to provide DOE with flexibility essential to maintaining a strong scientific and engineering effort to provide a base for future international negotiations on the next major, high-cost fusion device.

A. Operating expenses

The Committee authorized a total of $371,400,000.

B. Plant and capital equipment

The Committee authorized a total of $30,450,000.

C. Construction

The Committee authorized a total of $13,150,000.

ELECTRIC ENERGY SYSTEMS AND ENERGY STORAGE SYSTEMS: SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $36,813,000 which is $10,713,000 over the Administration request of $26,100,000.

A. Operating expenses

1. Electric Energy Systems. The Committee increased the Administration request by $7,200,000. The funding is to be allocated as follows:

Electric Field Effects. Add $1,700,000.
Reliability R&D. Add $1,500,000.
Systems Technology. Add $3,938,000.
Program Direction. Add $62,000.

2. Energy Storage Systems. The Committee increased the Administration request by $2,913,000. The funding is to be allocated as follows:

Battery Storage. Add $2,300,000.
Thermal and Mechanical Storage. Add $500,000.
Program Direction. Add $113,000.

B. Plant and capital equipment

Add $600,000 to the Administration request of $200,000: $300,000 for Electric Energy Systems and $300,000 for Energy Storage Systems.

SUPPORTING RESEARCH AND TECHNICAL ANALYSIS: SUMMARY OF COMMITTEE ACTIONS

The Committee recommendations authorize a total of $481,300,000 for Supporting Research and Technical Analysis programs, which is the Department's request.

In the specific subprograms, the Committee recommendations resulting in funding changes are as follows:

Operating expenses

Basic energy sciences.—(1) Increase of $8,500,000 to fulfill the second year of the Department's contractual agreement with the Supercomputer Computational Research Institute; and (2) within available funds, an additional $1,500,000 is provided for operations of the Weapons Neutron Research/Proton Storage Ring.

Plant and capital equipment

Basic energy sciences.—Increase of $500,000 to provide: (1) $1,000,000 to initiate the first year of a three-year construction project totalling $18,400,000 to make a world-class neutron scattering user facility out of the Weapons Neutron Research/Proton

Storage Ring (WNR/PSR) complex at Los Alamos National Laboratory, and (2) $1,400,000 for the Ion Collision Physics Facility.

General reduction

A general reduction of $9,000,000 to be applied across the Supporting Research and Technical Analysis programs at the Department's discretion to assure that funds not explicitly identified by the Committee may be used for the remaining highest priority programs, with the exception that this reduction shall not be applied to any ongoing or planned university project sponsored by the Department.

ENVIRONMENTAL R&D; SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $231,616,000 for environmental programs, which is an increase of $4,000,000 over the Administration's request, and restores the environmental program to the FY 1985 appropriations level.

A. Operating expenses

In the specific subprograms the Committee acted as follows:

(1) Biological/environmental research.—Increased the Administration's request by $4,000,000 for nuclear medicine research and treatment and for continuation of health effects research into the identification of risk of cancer causation.

GEOTHERMAL RESOURCES DEVELOPMENT FUND: SUMMARY OF COMMITTEE ACTIONS

The Committee recommendations authorize a total of $72,000 for the Geothermal Resources Development, which is the Department's request.

GENERAL SCIENCE AND RESEARCH: SUMMARY OF COMMITTEE ACTIONS

The Committee recommendations authorize a total of $685,400,000 for General Science and Research, which is the Department's request.

In the specific subprograms, the Committee recommendations resulting in funding changes are as follows:

Plant and capital equipment

High energy physics.—Increase of $10,000,000 to maintain fiscal year 1989 on-line schedules for the D-Zero detector at the Fermi National Accelerator Laboratory and the Stanford Linear Detector at the Stanford Linear Accelerator Center.

General reduction

A general reduction of $10,000,000 to be applied across General Science and Research programs with the proviso that there be no further reduction in high energy or nuclear physics facility utilization.

URANIUM ENRICHMENT R&D: SUMMARY OF COMMITTEE ACTIONS

The Committee agreed to the Administration request of $150,000,000.

IV. EXPLANATION OF PROGRAMS CONTAINED IN H.R. 1798

RESEARCH AND DEVELOPMENT—FISCAL YEAR 1986

A. FOSSIL ENERGY

[In thousands of dollars]

Fossil energy	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE request	Change to DOE request	Recommendations
Operating expenses:				
Control technology and coal preparation	35,068	27,249	+5,100	32,349
Advanced research and technology development	39,924	32,872	0	32,872
Coal liquefaction	25,815	19,386	+11,600	30,986
Combustion systems	30,218	29,243	−12,000	17,243
Fuel cells	40,811	9,342	+27,800	37,142
Heat engines	11,948	11,372	+3,000	14,372
Underground coal gasification	5,753	4,260	0	4,260
Magnetohydrodynamics (MHD)	30,977	0	+28,000	28,000
Surface coal gasification	32,011	15,028	+15,000	30,028
Subtotal, coal	252,525	148,752	+78,500	227,252
Enhanced oil recovery	11,801	11,972	0	11,972
Oil shale	14,751	9,675	+2,000	11,675
Advanced process technology	5,409	5,778	0	5,778
Subtotal, petroleum	31,961	27,425	+2,000	29,425
Unconventional gas recovery	10,227	8,872	0	8,872
Program direction	43,006	50,637	0	50,637
Subtotal, fossil energy operating expenses	337,719	235,686	+80,500	316,186
Capital equipment	4,425	3,000	0	3,000
Construction	4,916	3,985	0	3,985
Total, fossil energy	347,060	242,671	+80,500	323,171

The United States relies upon fossil energy sources—coal, oil and natural gas—for about ninety percent of its energy requirements. Currently, oil and gas account for about 80 percent of free world and 65 percent of U.S. energy consumption. Oil, the least abundant resource, constituting about 5 percent of U.S. estimated recoverable fossil fuel reserves, accounts for over 40 percent of consumption, while coal, accounting for over 80 percent of the estimated U.S. recoverable fossil reserves, contributes only about 20 percent of the energy consumption. As conventional supplies of domestic oil and gas are depleted, the nation will look increasingly to coal as a primary source of energy. Since coal is the largest domestic fossil energy resource and is comparatively underutilized, fossil energy research and development efforts aim to increase the use of coal, as well as to increase the availability of gas and petroleum resources.

The Department of Energy's fossil energy activities are divided into three categories: (1) coal, (2) petroleum, and (3) gas. The De-

partment's budget proposal for fiscal year 1986 requests $148.752 million for research activities, $27.425 million for petroleum research activities, $8.872 million for gas research activities, and $57.622 million for program direction and management support. The total $242.671 million request for fossil energy R&D represents a 30 percent reduction from the program's fiscal year 1985 appropriated level.

SUMMARY OF COMMITTEE ACTIONS

The Committee recommendations authorize a total of $323,171,000 for Fossil Energy Research and Development programs, which is $80,500,000 above the Department's request.

In the specific subprograms, the Committee recommendations resulting in funding changes are as follows:

Operating expenses

1. Control technology and coal preparation.—Increase of $5,100,000 to provide: (1) an increase of $3,000,000 for Coal Preparation, including $1,500,000 for Southern Illinois University high sulfur coal research and $1,500,000 for advanced microbubble flotation and electrochemical studies; (2) an increase of $1,100,000 for Flue Gas Cleanup to continue the evaluation of combined NO_x/SO_x in a dry scrubber process at Argonne National Laboratory; and (3) an increase of $1,000,000 for Waste Management for coal waste processing.

2. Coal liquefaction.—Increase of $11,600,000 to provide: (1) an increase of $5,100,000 for Indirect Liquefaction to continue operation of the LaPorte, Texas liquid phase methanol pilot plant through the end of fiscal year 1986; and (2) an increase of $6,500,000 for Advanced Process Development to continue operation of the Wilsonville, Alabama two-stage liquefaction pilot plant through the end of fiscal year 1986.

3. Combustion systems.—Decrease of $12,000,000 to provide: (1) an increase of $1,000,000 for Advanced Combustion Technology for advanced slagging, pulsed combustion systems; (2) an increase of $2,000,000 for Alternative Fuels for Electric Power Research Institute/Department of Energy combustion studies; and (3) to reduce the request for the Tennessee Valley Authority demonstration plant by $15,000,000 because funds for the plant have already been appropriated.

4. Fuel cells.—Increase of $27,800,000 to provide: (1) an increase of $23,300,000 for Phosphoric Acid Systems, including $2,300,000 for continuation of the 25 kW stack, $11,000,000 for a joint development program to design, build and demonstrate two 7.5 MW prototype power plants, and $10,000,000 for the water-cooled stack program; (2) an increase of $3,500,000 for Molten Carbonate Systems to continue the development of the direct fuel cell; and (3) an increase of $1,000,000 for Advanced Concepts for cost-shared research on solid oxide fuel cells.

5. Heat engines.—Increase of $3,000,000 for research on coal liquid fuels for diesel locomotive engines and turbine power systems, and within available funds provide $1,000,000 for a coal-fired Stirling engine study.

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6. Magnetohydrodynamics (MHD).—Increase of $28,000,000 to continue operation of two facilities and provide for development of materials and components.

7. Surface coal gasification.—Increase of $15,000,000 to provide: (1) an increase of $1,000,000 for Advanced Research aimed at bioprocessing sulfur removal; (2) an increase of $2,000,000 for Advanced Process Development for pollutant recycle studies; and (3) an increase of $3,000,000 for System Engineering Concepts ash agglomerating gasifier studies; and (4) an increase of $9,000,000 for operation of the Waltz Mill, Pennsylvania facility.

8. Oil shale.—Increase of $1,000,000 for Oil Shale Technology Base for eastern oil shale gasification studies, and an increase of $1,000,000 for generic eastern shale studies.

COMMITTEE VIEWS

Fuel cells

Molten carbonate fuel cells—competitive contracts.—The Committee is aware that the Department of Energy intends to open molten carbonate fuel cell research contracts to competitive bidding effective with fiscal year 1986 funds. The Committee is also aware that the Department's contract procedures encounter such long delays that the research these funds are provided to support would not be accomplished within the fiscal year the Committee intends. Should the fiscal year 1986 funded research be delayed, interrupted or diminished below intended levels, contractors will be forced into stretchouts of their contracts and in some cases could be forced to terminate research. The effect would be to significantly increase the cost of this work to the Government.

The Committee does not want this to happen and does not want the research provided for to be delayed or curtailed. The Committee, therefore, expects the Department to continue existing contracts at activity levels which maintain ongoing technical progress until the Department actually awards competitively procured contracts with fiscal year 1986 funds.

Contaminant-resistant molten carbonate fuel cell.—Molten carbonate fuel cells show significant performance degradation when exposed to contaminants, such as chlorine and sulfur, in the feed gas. A contaminant-resistant fuel cell would maintain a high level of performance with decreased complexity and feed gas cleanup process cost. The Committee encourages initiation of development of a contaminant-resistant molten carbonate fuel cell capable of processing gases containing chlorine and sulfur.

Heat engines

In addition to diesel and turbine engines, the Committee encourages the Department to pursue Stirling engines as a coal-using prime mover option.

Magnetohydrodynamics (MHD)

The MHD technology is ready for the integrated proof-of-concept system/subsystem tests. It is appropriate to focus the program on the least-cost, shortest development time—both to establish the

technology base for MHD power systems and to interest the private sector in subsequent commercialization of the technology.

The Committee encourages the Department and MHD program participants to work together on a plan which effectively utilizes present facilities, points to comprehensive process definition, and includes significant cost sharing in all program phases by both industry and government.

Surface coal gasification

The Committee encourages the utilization of the gasification pilot plant and related equipment at the Bituminous Coal Research Facility by the University of Pittsburgh in its ongoing coal research program.

Clean coal technologies

The Committee maintains a continuing interest in the Clean Coal Technologies Initiative. The Department was directed by legislation in the 98th Congress to solicit industry's views on those emerging coal technologies which could be commercialized following assistance through government incentives. The Committee is encouraged by the widespread industry response and awaits the Department's report analyzing the information, assessing the potential usefulness of each emerging clean coal technology, and identifying the extent to which Federal incentives will accelerate the commercial availability of these technologies.

COMMITTEE ACTIONS

Control technology and coal preparation

The Committee's recommendations for Coal Technology and Coal Preparation add a total of $5,100,000 to the Department's request, for total authorization of $32,349,000, and include the following: (1) an increase of $3,000,000 for Coal Preparation, including $1,500,000 for Southern Illinois University high sulfur coal research and $1,500,000 for advanced microbubble flotation and electrochemical studies; (2) an increase of $1,100,000 for Flue Gas Cleanup to continue the evaluation of combined NO_x/SO_x in a dry scrubber process at Argonne National Laboratory; and (3) an increase of $1,000,000 for Waste Management for coal waste processing.

Coal liquefaction

The Committee recommends adding $11,600,000 to provide: (1) an increase of $5,100,000 for Indirect Liquefaction to continue operation of the LaPorte, Texas liquid phase methanol pilot plant through the end of fiscal year 1986; and (2) an increase of $6,500,000 for Advanced Process Development to continue operation of the Wilsonville, Alabama two-stage liquefaction pilot plant through the end of fiscal year 1986.

2. The Committee has been advised that the Wilsonville, Alabama two-stage liquefaction plant will complete a multiyear, comprehensive program at the end of fiscal year 1986. Definite efforts should be made toward continued utilization of that facility, if applicable. Therefore, the Committee requests that the Department of Energy conduct a study and submit a report on future possibilities

for use of the Wilsonville pilot plant, including modifications necessary to incorporate the co-processing initiative.

Combustion systems

The Committee recommendations reduce the Combustion Systems Program by $12,000,000 to provide: (1) an increase of $1,000,000 for Advanced Combustion Technology for advanced slagging, pulsed combustion systems; (2) an increase of $2,000,000 for Alternative Fuels for Electric Power Research Institute/Department of Energy combustion studies; and (3) to reduce the request for the Tennessee Valley Authority demonstration plant by $15,000,000 because funds for the plant have already been appropriated.

Fuel cells

The Committee recommendations add $27,800,000 to provide (1) an increase of $23,300,000 for Phosphoric Acid Systems, including $2,300,000 for continuation of the 25 kW stack, $11,000,000 for a joint development program with industry to design, build and demonstrate two 7.5 MW prototype power plants, $6,000,000 for on-site 40 kW technology development, and $4,000,000 for 11 MW technology development; (2) an increase of $3,500,000 for Molten Carbonate Systems to continue the development of the direct fuel cell; and (3) an increase of $1,000,000 for Advanced Concepts for cost-shared research on solid oxide fuel cells.

Heat engines

The Committee recommendations add $3,000,000 for research on coal liquid fuels for diesel locomotive engines and turbine power systems. Also, within available funds, provide $1,000,000 for a coal-fired Stirling engine study.

Magnetohydrodynamics

The Committee recommendations add $28,000,000 to maintain operation of two facilities and to provide for development of materials and components.

Surface coal gasification

The Committee recommendations add $15,000,000 to provide: (1) an increase of $1,000,000 for Advanced Research to integrate a two-step bioprocessing technique for sulfur removal and gas upgrading; (2) an increase of $2,000,000 for Advanced Process Development for pollutant recycle gasification experiments; (3) an increase of $3,000,000 for System Engineering Concepts ash agglomerating gasifier studies in an existing high-pressure 8-inch diameter PRU; and (4) an increase of $9,000,000 for the Waltz Mill, Pennsylvania, gasifier operation.

Oil shale

The Committee is aware of significant differences in the physical, chemical and geological aspects of eastern and western oil shales. Due to the large amount of work performed in the past on western oil shales by both private and Federal laboratories, however, it is difficult to understand why the current level of research funding

on western shales is twice the level of research funding for the less-defined eastern shales. The Committee directs the Department of Energy to provide more research emphasis on eastern shales and to involve to a greater extent the colleges and universities which have acquired expertise on that resource. In addition, the Committee recommendations add $1,000,000 for Oil Shale Technology Base for eastern oil shale gasification studies, and $1,000,000 for generic eastern shale studies.

Fossil energy—General

In its consideration of the fiscal year 1985 Department of Energy Fossil Energy authorization request, the Committee directed the Department "to prepare a five year national coal science, technology, and engineering development research plan." Submittal was requested by October 1, 1984. The Department is directed to advise the Committee of the requested plan's status, the reasons for the delay in the delivery of the report, and the date when the plan will be available.

Detailed summary

Details of the Committee's recommendations, current year estimates and the budget request are shown on the following tables:

[In thousands of dollars]

	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE request	Change to DOE request	Recommendations
CONTROL TECHNOLOGY AND COAL PREPARATION				
Operating expenses:				
Coal preparation	10,965	10,302	+3,000	13,302
Flue gas cleanup	14,800	10,123	+1,100	11,223
Gas stream cleanup	7,351	5,613	0	5,613
Waste management	1,952	1,211	+1,000	2,211
Subtotal, operating expenses	35,068	27,249	+5,100	32,349
ADVANCED RESEARCH AND TECHNOLOGY DEVELOPMENT				
Operating expenses:				
Processes	8,788	0	0	0
Direct utilization	10,188	10,902	0	10,902
Materials and components	9,319	9,041	0	9,041
Technology crosscut	7,204	7,045	0	7,045
University coal research	4,425	5,884	0	5,884
Subtotal, operating expenses	39,924	32,872	0	32,872
COAL LIQUEFACTION				
Operating expenses:				
Advanced research	0	5,067	0	5,067
Indirect liquefaction	7,179	4,405	+5,100	9,505
Advanced process development	12,932	5,635	+6,500	12,135
Support studies/enginering evaluation	5,704	4,279	0	4,279
Subtoal, operating expenses	25,815	19,386	+11,600	30,986
COMBUSTION SYSTEMS				
Operating expenses:				
Atmospheric fluidized bed combustion	18,737	17,320	−15,000	2,320
Pressurized fluidized bed combustion	2,458	5,244	0	5,244

[In thousands of dollars]

	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE request	Change to DOE request	Recommendations
Advanced combustion technology	1,967	2,527	+1,000	3,527
Alternative fuels	7,056	4,152	+2,000	6,152
Subtotal, operating expenses	30,218	29,243	−12,000	17,243
FUEL CELLS				
Operating expenses:				
Phosphoric acid systems	28,912	0	+23,300	23,300
Molten carbonate systems	8,851	6,400	+3,500	9,900
Advanced concepts	3,048	2,942	+1,000	3,942
Subtotal, operating expenses	40,811	9,342	+27,800	37,142
HEAT ENGINES				
Operating expenses	11,948	11,372	+3,000	14,372
UNDERGROUND COAL GASIFICATION				
Operating expenses:				
Gasification technology development	3,098	2,460	0	2,460
Environmental and advanced research	2,655	1,800	0	1,800
Subtotal, operating expenses	5,753	4,260	0	4,260
MAGNETOHYDRODYNAMICS (MHD)				
Operating expenses	30,977	0	+28,000	28,000
SURFACE COAL GASIFICATION				
Operating expenses:				
Advanced research	0	3,495	+1,000	4,495
Advanced process development	4,376	3,303	+2,000	5,303
Systems engineering concepts	21,119	3,243	+12,000	15,243
Environment and engineering analysis	3,516	2,212	0	2,212
Great Plains coal gasification project	3,000	2,775	0	2,775
Subtotal, operating expenses	32,011	15,028	+15,000	30,028
ENHANCED OIL RECOVERY				
Operating expenses:				
Heavy oil	2,557	2,886	0	2,886
Light oil	8,064	7,711	0	7,711
Tar sands	1,180	1,375	0	1,375
Subtotal, operating expenses	11,801	11,972	0	11,972
OIL SHALE				
Operating expenses:				
Oil shale technology base	8,851	5,824	+2,000	7,824
Environmental mitigation	5,900	3,851	0	3,851
Subtotal, operating expenses	14,751	9,675	+2,000	11,675
ADVANCED PROCESS TECHNOLOGY				
Operating expenses:				
Advanced exploratory research	4,425	4,692	0	4,692
Arctic and offshore research	984	1,086	0	1,086
Subtotal, operating expenses	5,409	5,778	0	5,778
UNCONVENTIONAL GAS RECOVERY				
Operating expenses:				
Eastern gas shales	2,852	977	0	977
Western tight gas sands	5,113	5,634	0	5,634

[In thousands of dollars]

	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE request	Change to DOE request	Recommendations
Environmental and advanced research	2,262	2,261	0	2,261
Subtotal, operating expenses	10,227	8,872	0	8,872
HEADQUARTERS (HQ) AND ENERGY TECHNOLOGY CENTER (ETC) PROGRAM DIRECTION				
Operating expenses	43,006	50,637	0	50,637
Subtotal, fossil energy:				
Operating expenses	337,719	235,686	+80,500	316,186
Capital Equipment	4,425	3,000	0	3,000
Construction	4,916	3,985	0	3,985
Total	347,060	242,671	+80,500	323,171

B. Energy Conservation

[In thousands of dollars]

Energy conservation	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE request	Change to DOE request	Recommendations
Operating expenses:				
Buildings and community systems	34,135	27,800	+4,000	31,800
Industrial energy conservation	27,319	32,300	0	32,300
Multisector	20,792	24,700	+5,000	29,700
Transportation	50,697	39,075	+16,500	55,575
Subtotal, operating expenses	132,943	123,875	+25,500	149,375
Capital equipment:				
Buildings and community systems	1,225	2,200	0	2,200
Industrial energy conservation	2,156	0	0	0
Multisector	1,666	1,000	0	1,000
Transportation	2,940	0	0	0
Subtotal, capital equipment	7,987	3,200	0	3,200
Construction: Transportation	6,490	2,700	0	2,700
Total, energy conservation	147,420	129,775	+25,500	155,275

The Energy Conservation R&D activities funded in the Committee's recommendation include basic and applied research on energy use in buildings, communities, industry, and transportation. Advanced crosscutting research in the combustion and thermal sciences, materials, biocatalysis, and tribology is also supported, as is a program to provide technical assistance to inventors of energy efficient products. The Department's fiscal year 1986 request for Energy Conservation R&D totals $129.775 million, a decrease of $17.645 million from the fiscal year 1985 appropriation.

SUMMARY OF COMMITTEE ACTIONS

The Committee recommendations authorize a total of $155,275,000 for Energy Conservation programs, which is $25,500,000 above the Department's request of $129,775,000.

In the specific subprograms, the Committee recommendations resulting in funding changes are as follows:

Operating expenses

1. Building and community systems.—Increase of $4,000,000 to provide: (1) an increase of $1,000,000 for Building Systems activities, including an additional $400,000 for Building Materials Research to restore funding to the fiscal year 1985 appropriation level, and an additional $600,000 for Buildings Integration that restores funding to commercial building systems interactions; (2) $1,000,000 for Technology and Consumer Products to continue R&D on Stirling and absorption concepts for the Thermally Activated Heat Pumps activity; and (3) $2,000,000 to continue the Urban Consortium Energy Task Force. Within available funds, provide $900,000 to develop a cost-shared initiative to design, build, and scale up a photochemical mercury isotope separation process under the management of the Lawrence Berkeley Laboratory lighting research laboratory.

2. Multi-sector.—Increase of $5,000,000 to provide: (1) an increase of $6,000,000 for the Energy Conversion and Utilization Technologies (ECUT) Materials Research Project to initiate an innovative steel research program; and (2) to decrease the ECUT Biocatalysis Project by $1,000,000 in order to provide a more modest increase of 14 percent above the fiscal year 1985 appropriation.

3. Transportation.—Increase of $16,500,000 for the Stirling engine program and for the Electric Vehicle program. Reprogram approximately $2,500,000 in previously appropriated funds to the Electric Vehicle program.

B.(i)—The following are program descriptions, Committee views, and Committee actions for the Conservation R&D programs authorized by the Subcommittee on Energy Development and Applications:

COMMITTEE VIEWS

Buildings and community systems

The Committee is concerned that the Building and Community Systems program may not be sufficiently communicative with relevant professional societies and outside industrial groups to assure program relevance and technology transfer. Prior to the release of the fiscal year 1987 budget request, the Committee will work with both the Department of Energy and outside groups to evaluate these concerns and the program, with the intent to assure that the program is indeed relevant and that technology is being transferred.

Industrial energy conservation

The Committee encourages the Industrial Energy Conservation Program to work with the Electric Power Research Institute

(EPRI) in planning and sponsoring selected innovative projects in EPRI Research and Development Applications Centers.

The Committee encourages the Industrial Energy Conservation Program to review the technical feasibility of a new thermochemical recuperator system (TCR) for high temperature heat recovery.

COMMITTEE ACTIONS

Buildings and community systems

Within the funds available for Buildings and Community Systems, the Committee directs the Department of Energy to provide $900,000 to develop a cost-shared initiative to design, build, and scale up a photochemical mercury isotope separation process under the management of the Lawrence Berkeley Laboratory lighting research laboratory.

Building systems.—The Committee recommendation adds $1,000,000 to the Department's Buildings Systems subprogram request of $12,900,000, for a total subprogram authorization of $13,900,000. These additional funds are to be applied as follows: (1) $600,000 to restore funding to carry out required R&D in commercial building system interactions; and (2) $400,000 to restore the funding for Building Materials Research to fiscal year 1985 appropriated levels. The Committee also redirects $400,000 from the Buildings Systems Integration Research Performance Calculations research to Building Subsystems Research on Windows and Daylighting research.

Building subsystems research.—The Committee directs the Department to submit a report on indoor air quality (IAQ) to the Committee by December 1, 1985. This IAQ report shall identify Federal interagency efforts to coordinate IAQ research since the establishment of the Committee on Indoor Air Quality in 1983. The IAQ report should identify R&D activities undertaken by the Department and related Federal agencies and identify the extent of participation by the private sector in the activities conducted to date. The report should also identify the Department's research activities required through 1990 based on experience to date. Such a report should include a research agenda with goals, objectives, milestones, resource requirements, and designation of how R&D results will be used by the public and private sectors.

Building systems integration research.—The Committee directs the Department to prepare a multiyear (5 year) plan to define, identify and assess building systems integration (whole building) research needs, goals, objectives, resource needs, milestones and schedules to ensure that future activities are carried out in a rational manner. Such plan should also address recent innovative alternatives including the "smart house". The Department shall develop the plan in consultation with the private sector and submit it to the Committee by December 1, 1985.

Community systems.—The Committee recommendation adds $2,000,000 to the Department's request of $2,000,000, for a total Community Systems subprogram authorization of $4,000,000. These additional funds are provided for the Urban Consortium Energy Task Force to continue local government energy management R&D at current levels. In addition, the Committee, in its reports (House

Report 98-686 and House Report 98-688, Part 1) accompanying the Department of Energy Civilian Research and Development Authorization Act for Fiscal Years 1985, 1986, and 1987 (H.R. 5244 and H.R. 5245), instructed the Department to submit a five year plan for community systems research and development, including the integration of the Urban Consortium Energy Task Force program, by October 1, 1984. The Department is directed to advise the Committee of the status of each of these plans, the reasons for the delays in their delivery, and the dates when they will be available.

Technology and consumer products.—The Committee recommendations add $1,000,000 to the Department's request of $9,4000,000, for a total Technology and Consumer Products subprogram authorization of $10,400,000, to continue R&D on Stirling and absorption concepts for the Thermally Activated Heat Pumps activity in order to exploit the high-performance potential of gas-fired heat pumps.

Multi-sector

Energy conversion and utilization technologies (ECUT) materials project.—The Committee recommendation provides an addition of $6,000,000, for an innovative steel research program and related R&D activities for direct reduction of iron ore to liquid steel, and casting of near net shapes using electromagnetic fields. This addition provides a total Materials Project authorization of $12,000,000.

The Committee has added significant support in the fiscal year 1986 budget to support an initiative among the steel industry, Department of Energy laboratories and universities for research purposes; the Committee expects that the university participation in this initiative be both significant and real. A multiyear program has been suggested. Two areas of study have been proposed. For its fiscal year 1986 support and prior to subsequent years, the Department is directed to provide the Committee with a comprehensive plan, including, but not limited to, a management plan, multiyear program scope, areas of investigation, extent of and identity of participants, project and program costs, cost-sharing arrangements, and technology transfer processes.

ECUT biocatalysis research project.—The Committee recommendation reduces the Department's request for the Biocatalysis Project by $1,000,000, from $3,285,000 to $2,285,000. The Department's request represents a 64 percent increase above the fiscal year 1985 level; the Committee's recommendation provides a lower, but positive, Project growth rate of 14 percent.

Detailed summary

Details of the Committee's recommendations, current year estimates and the budget request are shown on the following tables:

[In thousands of dollars]

Energy conservation	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE Request	Change to DOE Request	Recommendations
BUILDING AND COMMUNITY SYSTEMS				
Operating expenses:				
Building systems	14,897	12,900	+1,000	13,900
Community systems	5,390	2,000	+2,000	4,000
Urban waste	980	0	0	0
Technology and consumer products	9,997	9,400	+1,000	10,400
Program direction	2,871	3,500	0	3,500
Subtotal, operating expenses	34,135	27,800	+4,000	31,800
Capital equipment	1,225	2,200	0	2,200
Total, building and community system R&D	35,360	30,000	+4,000	34,000
INDUSTRIAL ENERGY CONSERVATION				
Operating expenses:				
Waste energy reduction	11,859	12,256	0	12,256
Process efficiency	9,556	13,500	0	13,500
Cogeneration	4,116	4,700	0	4,700
Program direction	1,788	1,844	0	1,844
Subtotal, operating expenses	27,319	32,300	0	32,300
Capital equipment	2,156	0	0	0
Total, industrial energy conservation R&D	29,475	32,300	0	32,300
MULTISECTOR				
Operating expenses:				
Energy related inventions	4,900	5,000	0	5,000
Energy conversion and utilization technologies (ECUT)	15,608	19,190	+5,000	24,190
Program direction (ECUT)	284	510	0	510
Subtotal, operating expenses	20,792	24,700	+5,000	29,700
Capital equipment	1,666	1,000	0	1,000
Total, multisector R&D	22,458	25,700	+5,000	30,700

B.(ii)—The following are program descriptions and Committee actions for the Conservation R&D programs authorized by the Subcommittee on Transportation, Aviation and Materials:

TRANSPORTATION

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority	1986 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Vehicle propulsion R&D	31,852	20,100	+15,000	35,100
Electric and hybrid vehicle R&D	8,429	6,075	+1,500	7,575
Alternate fuels utilization	2,450	1,600	0	1,600
Advanced materials development	6,076	9,290	0	9,290
High temperature materials lab	0	310	0	310
Program direction	1,890	1,700	0	1,700
Subtotal	50,697	39,075	+16,500	55,575
Capital equipment	2,940	0	0	0

TRANSPORTATION—Continued

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority	1986 DOE request	Changes to DOE request	Total authorization
Construction: High temperature materials lab.	6,469	2,700	0	2,700
Total program	60,106	41,775	+16,500	58,275

The objective of the Transportation Program is to perform research and development on vehicles and engines which will increase the fuel efficiency of the transportation system and allow a switch from petroleum to electricity and alternative fuels. The strategy to achieve this objective includes emphasis on technology development rather than product design, maximum involvement by U.S. industry in identification and solution of technology problems, and concentration on key technology barriers where risks prohibit industry-only financing.

Vehicle propulsion R&D

The goal of the Vehicle Propulsion R&D program is to encourage development within the transportation industry of more fuel-efficient, fuel-flexible and cost-effective transportation propulsion system options through support of research and development on technological barriers and proof of concepts.

Electric and hybrid vehicle R&D

The goal of the Electric and Hybrid Vehicle program is to develop the technology, in cooperation with industry, that will lead to the production and introduction of electric vehicles into the Nation's transportation fleet. Since electricity is generated by many different sources of fuel such as coal, hydro or nuclear, the use of electric vehicles would substitute more abundant sources of energy for petroleum-based fuels.

Alternative fuels utilization

The goal of the Alternative Fuels Utilization program is to encourage the use of non-petroleum-based fuels in the transportation sector by establishing a utilization-oriented data base for alternative fuels in both contemporary and advanced heat engines. The approach has been to conduct systematic investigations of the fundamentals of alternative fuel use problems in both spark-ignition and diesel engines, concentrating on nearer-term fuels first (alcohols) and expanding the data base in subsequent stages to include synthetic fuels and advanced engines.

Advanced materials development

The goal of the Advanced Materials Development program is to develop an industrial technology base in structural ceramics and ceramic composites capable of providing reliable and cost-effective components for high-temperature, efficient transportation propulsion systems while eliminating requirements for scarce strategic materials.

High temperature materials laboratory

To support the advanced high-temperature materials efforts both within government and industry, construction of a High Temperature Materials Laboratory (HTML) at Oak Ridge National Laboratory was initiated in fiscal year 1983. The HTML will provide a unique capability for high-temperature materials research which (1) makes available a broad multidisciplinary professional staff, (2) provides a common focal point for industrial/university/government participation, and (3) provides access to high-cost research equipment which would otherwise be denied many researchers.

COMMITTEE ACTION

The Department of Energy requested $41,775,000 for Transportation R&D in Fiscal Year 1986. This amount is 30 percent less than the amount appropriated for Fiscal Year 1985.

Despite Congressional intention to continue the Stirling engine proof-of-concept demonstration, as indicted both in recent authorizations and appropriations, the DOE has again proposed termination of the project. The Committee believes this action is shortsighted. Accordingly, it recommends $15,000,000 for continuation of the Stirling project toward development and characterization of MOD II.

Budget requests for developing electric and hybrid vehicle technology have declined sharply in recent years. Yet, the Committee believes the underlying reasons for passage of the Electric Vehicle Research, Development and Demonstration Act of 1976 remain valid. Accordingly, it recommends restoring two modest programs, both with high levels of private sector cost sharing and with great potential for advancing electric vehicle technology for eventual widespread use. These are support to the Site Operators User Task Force ($850K) and the DOE/EPRI Van Field Test ($650K).

In addition to the new authorization provided by this bill, the Committee recommends that funds previously authorized and appropriated to the Electric and Hybrid Vehicle Program for Research, Development, Test and Engineering, including any funds recovered from the Workout Agreement with Jet Industries, be reprogrammed to the Advanced A.C. Propulsion System Project (ETX-II). The estimated amount of these funds is $2.5 million. The total new authorization for FY 86 is $58,275,000.

C. Energy Supply R&D

The Energy Supply R&D programs funded in the Committee's recommendations are Solar Energy, Geothermal Energy, Nuclear Fission, Magnetic Fusion Energy, Electric Energy Systems, Energy Storage Systems, Supporting Research and Technical Analysis, and Environmental R&D.

1. SOLAR ENERGY

[In thousands of dollars]

Solar energy	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE Request	Change to DOE Request	Recommendations
Operating expenses:				
Solar buildings energy systems	9,540	9,000	+1,000	10,000
Photovoltaic energy systems	46,105	43,600	0	43,600
Solar thermal energy systems	34,720	28,100	+1,000	29,100
Biofuels energy systems	29,820	27,800	0	27,800
Wind energy systems	28,680	20,000	0	20,000
Ocean energy systems	4,480	3,500	+1,500	5,000
Program support	1,000	1,300	0	1,300
Resource assessment	0	950	0	950
Program direction	4,766	4,900	0	4,900
Subtotal, operating expenses	159,111	139,150	+3,500	142,650
Capital equipment:				
Solar buildings energy systems	200	500	0	500
Photovoltaic energy systems	1,000	1,200	0	1,200
Solar thermal energy systems	500	300	0	300
Biofuels energy systems	1,000	600	0	600
Wind energy systems	200	800	0	800
Solar energy research institute	0	261	0	261
Resource assessment	0	50	0	50
Subtotal, Capital Equipment	2,900	3,711	0	3,711
Construction:				
84–CF–001, Phase III Sacramento Municipal Utility District Photovoltaics Plant, 5MW	9,500	0	0	0
86–CE–001, Solar Energy Research Institute (SERI), General Plant Projects	0	2,071	0	2,071
Subtotal, Construction	9,500	2,071	0	2,071
Total, solar energy	171,511	144,932	+3,500	148,432

The Solar Energy Research and Development program carries out basic and applied research and exploratory and technology development aimed at reducing the cost, improving the performance, and expanding the technology and knowledge base of solar energy systems.

SUMMARY OF COMMITTEE ACTIONS

The Committee recommendations authorize a total of $148,432,000, which is $3,500,000 above the Department's request.

In the specific subprograms, the Committee recommendations resulting in funding changes are as follows:

Operating expenses

1. Solar buildings energy systems.—(1) Increase of $1,000,000 for a building systems test facility in the Southeast to address cooling issues in hot humid climates using full-scale single and multifamily prototypes; (2) redirect $700,000 from Solar Buildings Materials and Components Thin Film Flatplate Collector R&D to Solar Buildings Materials and Components Apertures R&D; and (3) within avail-

able funds, provide $900,000 for Solar Building Technology Transfer activities.

2. Photovoltaic energy systems.—Within available funds, provide $450,000 for the Photovoltaic Southeast Residential Experiment Station and $450,000 for the Photovoltaic Southwest Residential Experiment Station.

3. Solar thermal energy systems.—Increase of $1,000,000 for solar bowl studies.

4. Biofuels energy systems.—No change by (1) increasing Thermochemical Conversion by $2,100,000 million to provide a medium-Btu gasification base research program of $4,000,000, and by (2) decreasing Biochemical Conversion by $2,100,000 to provide a more modest 25 percent increase above the fiscal year 1985 appropriation.

5. Ocean energy systems.—Increase of $1,500,000 to provide: (1) an additional $1,000,000 for open cycle experiments, and (2) $500,000 for initiation of a jointly funded cooperative research program in ocean energy and technology.

COMMITTEE VIEWS

Solar buildings energy systems

At the present time, the Department of Energy devotes equal funding in the Solar Buildings Energy Systems R&D program to solar active building systems and solar passive building systems. The Committee is advised by industry that greater emphasis should be applied to solar passive building systems relative to solar active building systems, and that a two-to-one ratio is more responsible to industry needs as indicated by the marketplace. There is also the claim that the transfer of technology to industry is deficient and warrants greater attention. During the current calendar year, the Committee will evaluate this program with the assistance of both the Department and industry to assure program relevance and information dissemination.

Solar energy research institute

The Committee has reviewed and approved the extensive general purpose improvements requested by the Solar Energy Research Institute (SERI). However, before additional general improvement funding is requested, a comprehensive survey should be made of SERI plans and objectives, present facilities and their adequacies, possible future facilities needs, methods of meeting needs, and costs of implementation. The Committee will conduct such a survey during the current calendar year with the assistance of the Department of Energy.

The Committee recognizes that significant progress has been made in the conceptual design of Phase II of the permanent laboratory facilities at SERI. Accordingly, subject to Committee approval, up to $750,000 of the funds authorized by this Act for General Plant Projects (GPP) at SERI may be used for continued development of conceptualization studies and the development of a construction plan for the next SERI laboratory.

COMMITTEE ACTIONS

Solar buildings energy systems

The Committee recommendations add $1,000,000 for a building systems test facility in the Southeast to address cooling issues in hot humid climates using full-scale single and multifamily prototypes. In addition, the Committee redirects $700,000 from Solar Buildings Materials and Components Thin Film Flatplate Collector R&D to the Solar Buildings Materials and Components Apertures R&D activity for a total of $1,250,000; and directs that, within available funds for Solar Buildings Energy Systems, $900,000 be provided for Solar Buildings Technology Transfer activities.

Photovoltaic energy systems

Within available funds for the Photovoltaic Energy Systems program, the Committee directs the Department of to provide $450,000 for the Photovoltaic Southeast Residential Experiment Station and $450,000 for the Photovoltaic Southwest Residential Experiment Station.

Solar thermal energy systems

The Committee recommendations add $1,000,000 for Solar Thermal Collection Technology Research for solar bowl studies, resulting in a fiscal year 1986 authorization of $13,900,000 for Collection Technology Research, and $29,400,000 for the Solar Thermal Energy Systems program. The Committee directs the Department of Energy to withhold the $1,000,000 increase for the solar bowl studies until all the following conditions are met: the Crosbyton, Texas work contract is completed, the Crosbyton final report is complete and released to the Department of Energy, the Crosbyton report is provided to the General Accounting Office (GAO), and GAO has favorably reported on the concept to the Committee relative to all solar processes and configurations. Upon review of the GAO report, the Committee shall make a determination on the obligation of the funds. If the funds remain unobligated for the Crosbyton program, such funds may not be reprogrammed for any other purpose.

This Committee, in conjunction with the House Appropriations Subcommittee on Energy and Water Development, requested on October 5, 1984, that the Department provide a multiyear plan on Solar Thermal R&D. The Committee urges the Department to complete this plan by July 30, 1985, so that its findings can be incorporated into the fiscal year 1987 budget request, and used by this Committee in its fiscal year 1987 authorization deliberations.

Biofuels energy systems

Thermochemical conversion.—The Committee adds $2,100,000 to increase the medium-Btu gasification base research program to $4,000,000. This provides a level that is $1,300,000 below the fiscal year 1985 appropriation of $5,300,000, to maintain a minimum viable program in support of the scaleup of one promising medium-Btu gasification process and other advanced concepts.

Biochemical conversion.—The Committee reduces Biochemical Conversion by $2,100,000 for a fiscal year 1986 authorization of

$6,000,000, an increase of 25 percent above the fiscal year 1985 appropriation level of $4,500,000.

Wind energy systems

The Committee, in its reports (House Report 98-686 and House Report 98-688, Part 1) accompanying the Department of Energy Civilian Research and Development Authorization Act for Fiscal Years 1985, 1986, and 1987 (H.R. 5244 and H.R. 5245), directed the Department "to report to the Committee no later than October 1, 1984, on its plans to manage the horizontal axis wind turbine R&D program when NASA Lewis ceases to carry out its program support activities." The Committee directs the Department to advise the Committee of the status of this report, the reasons for the delays in its delivery, and the date when it will be available.

Ocean energy systems

The Committee recommendations add $1,500,000 to the Department's request for a total fiscal year 1986 Ocean Energy Systems authorization of $5,000,000.

The Committee adds $1,000,000 to provide increased funding for open cycle experiments including a cost-shared 50 kW experiment which uses the warm water from the outflow of a Florida Power and Light power plant and the cold water from a well close to the power plant to provide an appropriate thermal gradient. The Committee also adds $500,000 for initiation of a jointly funded cooperative research program in ocean energy and technology with the Pacific International Center for High Technology Research directed at development of a 200 kW integrated open cycle OTEC experimental system at the National Energy Laboratory of Hawaii.

The Committee, in its reports (House Report 98-686 and House Report 98-688, Part 1) accompanying the Department of Energy Civilian Research and Development Authorization Act for Fiscal Years 1985, 1986, and 1987 (H.R. 5244 and H.R. 5245), directed the Department "to prepare a multiyear plan for ocean energy systems research and development directed at long term needs and generic, high risk problems. The plan should be consistent with the findings and recommendations of the OTA staff paper on OTEC and the February 9-10, 1984 OTEC workshop as summarized by OTA in its testimony to the EDA Subcommittee on February 28, 1984. The report should be submitted to the Committee no later than October 1, 1984." The Committee directs the Department to advise the Committee of the status of this report, the reasons for the delays in its delivery, and the date when it will be available.

Tax credits

The Committee, in its reports (House Report 98-686 and House Report 98-688, Part 1) accompanying the Department of Energy Civilian Research and Development Authorization Act for Fiscal Years 1985, 1986, and 1987 (H.R. 5244 and H.R. 5245), requested the Secretary of Energy "to submit to Congress a report on the role of research and development and investment tax incentives in the development and utilization of advanced renewable energy and conservation technologies. Such report shall include an estimate, to the maximum extent possible, of the possible loss of federal reve-

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nues as a result of an extension of the current business energy tax credit for an additional three years". The Committee directs the Department to advise the Committee of the status of this report, the reasons for the delays in its delivery, and the date when it will be available.

Detailed summary

Details of the Committee's recommendations, current year estimates and the budget request are shown on the following tables:

[In thousands of dollars]

Solar energy	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE request	Change to DOE request	Recommendations
Solar buildings energy systems:				
Materials and components research	6,650	4,900	0	4,900
Systems research and development	2,890	4,100	+1,000	5,100
Subtotal, operating expenses	9,540	9,000	+1,000	10,000
Capital equipment:	200	500	0	500
Total, solar building energy systems	9,740	9,500	+1,000	10,500
Photovoltaic energy systems:				
Materials research	30,605	31,650	0	31,650
Collector research	10,500	10,500	0	10,500
Systems research	5,000	1,450	0	1,450
Subtotal, operating expenses	46,105	43,600	0	43,600
Capital equipment	1,000	1,200	0	1,200
Construction	9,500	0	0	0
Total, photovoltaic energy	56,605	44,800	0	44,800
Solar thermal energy systems:				
Collection technology research	12,432	12,900	+1,000	13,900
Energy conversion technology research	5,434	4,500	0	4,500
Systems technology research	15,338	9,700	0	9,700
Planning and assessment	1,516	1,000	0	1,000
Subtotal, operating expenses	34,720	28,100	+1,000	29,100
Capital equipment	500	300	0	300
Total, solar thermal energy	35,220	28,400	+1,000	29,400
Wind energy systems:				
Aerodynamics research	7,780	9,200	0	9,200
Structural dynamics research	5,500	7,100	0	7,100
Wind energy research center	1,700	1,900	0	1,900
Systems Analysis	700	500	0	500
Advanced multimegawatt turbine (MOD-5B)	13,000	1,300	0	1,300
Subtotal, operating expenses	28,680	20,000	0	20,000
Capital equipment	200	800	0	800
Total, wind energy	28,880	20,800	0	20,800
Biofuels energy systems:				
Short rotation intensive culture	4,200	4,700	0	4,700
Production research	5,970	3,600	0	3,600
Thermochemical conversion	11,150	9,400	+2,100	11,500
Biochemical conversion	4,500	8,100	−2,100	6,000
Regional biomass program	4,000	2,000	0	2,000
Subtotal, operating expenses	29,820	27,800	0	27,800

[In thousands of dollars]

Solar energy	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE request	Change to DOE request	Recommendations
Capital equipment	1,000	600	0	600
Total, biofuels energy	30,820	28,400	0	28,400
Ocean energy systems:				
Materials and structures research	580	600	0	600
Thermodynamic research	1,650	1,567	+1,500	3,067
Experimental verification and testing	1,800	1,333	0	1,333
Environmental and oceanographic research	150	0	0	0
Wave energy	300	0	0	0
Total, ocean energy	4,480	3,500	+1,500	5,000
Solar resource assessment:				
Operating expenses	0	950	0	950
Capital equipment	0	50	0	50
Total, solar resource assessment	0	1,000	0	1,000
Program direction, solar energy	4,766	4,900	0	4,900
Solar Energy Research Institute:				
Capital equipment	0	261	0	261
Construction	0	2,071	0	2,071
Total, SERI	0	2,332	0	2,332
Solar program support	1,000	1,300	0	1,300
Subtotal, solar energy:				
Operating expenses	159,111	139,150	+3,500	142,650
Capital equipment	2,900	3,711	0	3,711
Construction	9,500	2,071	0	2,071
Total, solar energy	171,511	144,932	+3,500	148,432

2. GEOTHERMAL ENERGY

[In thousands of dollars]

Geothermal energy	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE request	Change to DOE request	Recommendations
Operating expenses:				
Hydrothermal industrialization	990	0	0	0
Geopressured resources	5,400	3,600	0	3,600
Geothermal technology:				
Hot dry rock research	7,500	5,500	0	5,500
Hydrothermal research	9,729	8,000	+1,000	9,000
Hard rock penetration research	4,400	2,400	+1,500	3,900
Magma energy extraction	1,400	4,400	−3,000	1,400
Technology transfer	1,000	0	+500	500
Subtotal, geothermal technology	24,029	20,300	0	20,300
Program direction	1,025	800	0	800
Subtotal, operating expenses	31,444	24,700	0	24,700

[In thousands of dollars]

Geothermal energy	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE request	Change to DOE request	Recommendations
Capital equipment:				
Geothermal technology development	400	500	0	500
Subtotal, capital equipment	400	500	0	500
Total, geothermal energy	31,844	25,200	0	25,200

U.S. geothermal resources include steam, hot water, geopressured methane, hot dry rock, and magma. The Geothermal Energy research and development program is aimed at resolving the technical problems which include uncertainties in determining size and life of reservoirs, unusually high drilling costs and lack of well stimulation techniques, the need for injection technology for economic disposal of spent brines, major corrosion and materials problems, environmental problems, and lack of efficient components. The Department's fiscal year 1986 request of $25.2 million funds two major activity areas: Geopressured Resources ($3.6 million) and Geothermal Technology ($20.8 million). In addition, $800,000 is requested for program direction.

SUMMARY OF COMMITTEE ACTIONS

The Committee recommendations authorize a total of $25,200,000 for Geothermal Energy research and development, which is the Department's request.

In the specific subprograms, the Committee recommendations resulting in funding changes are as follows:

Operating expenses

Geothermal technology.—No net change, but provide: (1) an increase of $1,000,000 for Hydrothermal Research to restore Heat Cycle Research, Permeability Enhancement, Materials Research, including $500,000 for the Salton Sea Scientific Drilling Project to bring total Project funding in fiscal year 1986 to $1,000,000; (2) an increase of $1,500,000 for Hard Rock Penetration Research to restore R&D activities in several cost-shared drilling projects; (3) an increase of $500,000 for Technology Transfer to continue information dissemination; and (4) a decrease of $3,000,000 to continue Magma Energy Extraction at the fiscal year 1985 appropriation level.

COMMITTEE VIEW

Geothermal technology—Hot dry rock research

In its review of the hot dry rock research being conducted by the Los Alamos National Laboratory, the Committee has determined that the $5,500,000 authorized for the Department in fiscal year 1986 should be adequate, when combined with a $5,000,000 contribution from the International Energy Agency (IEA) participants, to continue a viable research program. The Committee directs the Department to make every effort in its negotiations with the IEA participants to assure their continued full participation. The Commit-

tee strongly endorses the overall research program in hot dry rock and intends to fund the program at a level which is adequate to maintain its viability and to assure accomplishment of its research objectives.

Geothermal technology—Hydrothermal research

The Committee recommendation adds funds ($500,000 above the Department's fiscal year 1986 request) to the Hydrothermal Research activity for the Salton Sea Scientific Drilling Project to supplement previously authorized funds. The additional funds indicate the Committee's continued commitment to the plan to drill a deep research well in the Salton Sea geothermal field. The Committee believes that the project shows great promise and that probing this unique pressure/temperature environment is a logical development in hydrothermal research with important implications for understanding future sources of geothermal energy. The Salton Sea well will be a significant step in a national program of continental scientific drilling supported by the National Science Foundation and the U.S. Geological Survey, in addition to the Department of Energy.

The Salton Sea project was authorized by the Committee in fiscal year 1984 as an "add-on" experiment to a proposed commercial geothermal well. The intent had been to deepen a geothermal well being drilled by industry from 12,000 feet to a total depth of 18,000 feet in order to reach greater pressures and temperatures than had yet been probed by drilling in any hydrothermal system. Since the project was authorized, additional costs above the $5.9 million estimate have been incurred because the Department issued a Request for Proposals which altered the original "add-on" experiment and resulted in the current plan to drill a new well from the surface. Stringent technical requirements by state regulatory agencies have also added to the estimated costs.

The Committee is concerned with the delay of the project, and urges the Department to take the necessary steps to proceed expeditiously, and in a manner that will provide the scientific results anticipated in the original definition of the project.

COMMITTEE ACTIONS

Geopressured resources

The Committee, in its reports (House Report 98-686 and House Report 98-688, Part 1) accompanying the Department of Energy Civilian Research and Development Authorization Act for Fiscal Years 1985, 1986, and 1987, instructed the Department "to prepare for the Committee a plan to gradually reduce federal involvement in this area, particularly in large scale well testing, based on a realistic assessment of when sufficient information will be obtained to resolve the outstanding resource, technology, and economic questions associated with geopressured geothermal systems. The plan shall be transmitted to the Committee no later than October 1, 1984." The Committee directs the Department to advise the Committee of the status of this plan, the reason for the delay in its delivery, and the date this document will be available.

Geothermal technology

The Committee endorses the Department's fiscal year 1986 request of $20.8 million for Geothermal Technology, but redirects funds to provide: (1) an increase of $1,000,000 for Hydrothermal Research to restore Heat Cycle Research, Permeability Enhancement, Materials Research, including $500,000 for the Salton Sea Scientific Drilling Project to bring total Project funding in fiscal year 1986 to $1,000,000; (2) an increase of $1,500,000 for Hard Rock Penetration Research to restore R&D activities in several cost-shared drilling projects; (3) an increase of $500,000 for Technology Transfer to continue infomation dissemination; and (4) a decrease of $3,000,000 to continue Magma Energy Extraction at the fiscal year 1985 appropriation level of $1,400,000.

The Committee, in its reports (House Report 98-686 and House Report 98-688, Part 1) accompanying the Department of Energy Civilian Research and Development Authorization Act for Fiscal Years 1985, 1986, and 1987, instructed the Department "to submit, by October 1, 1984, a plan for transition of Hot Dry Rock activities to the private sector. The plan should include a discussion of future plans for the Fenton Hill site, the desirability of further hot dry rock experiments at alternative sites co-funded by the private sector, and the need, if any, for a long term technology base research program in this area." The Committee directs the Department to advise the Committee of the status of this plan, the reason for the delay in its delivery, and the date this document will be available.

3. NUCLEAR FISSION R&D PROGRAMS

General

In the 98th Congress the Committee suggested that the Department of Energy (DOE) reexamine the role of the Nuclear Fission Research and Development programs to emphasize support of advanced reactor concepts. The Committee observes that the modular reactors, with passively safe features, not only have received widespread industry support, but are viewed as increasingly desirable by the utilities as they allow for incremental load growth and more flexible planning. The Committee is pleased that the DOE has recognized the need for such an emphasis by encouraging development of the Modular High Temperature Gas-Cooled Reactor (MHTGR) and innovative liquid metal and space nuclear power reactor designs. Nevertheless, the Committee believes that the DOE must demonstrate a stronger linkage between the liquid metal and breeder technology R&D elements so that these latter activities can go forward in a truly focused fashion. The Committee is also encouraged by the DOE's enhanced support of the Space Nuclear Power program, but desires greater emphasis on a goal-oriented MHTGR program as stated in the Committee View. The Improved LWR Technology program and Advanced LWR activity under Advanced Converters should comprise the near-term complement to advanced reactor concept development.

a. Civilian Reactor Development

(1) IMPROVED LIGHT WATER REACTOR TECHNOLOGY

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Improved LWR development	19,691	21,000	0	21,000
Three Mile Island R&D	29,150	32,300	0	32,300
Subtotal, operating	48,841	53,300	0	53,300
Capital equipment:				
Three Mile Island R&D	1,500	0	0	0
Subtotal, capital equipment	1,500	0	0	0
Total	50,341	53,300	0	53,300

Improved LWR development

The Improved LWR Development activity is divided into the following tasks: (1) improving the operation, plant availability and extending the overall plant life of nuclear reactors; and (2) enhancing plant safety and improving the licensability.

To meet these objectives, the DOE is to consider the technical appropriateness of current regulatory requirements and recommend improvements; determine causes of component and systems failures and develop means to prevent, or at least improve, mean time between failure; develop criteria for long plant life; explore the application of artificial intelligence and robotics to reduce worker exposure as well as to extend nuclear plant availability; analyze the cause and effects of feedwater transients and the means to reduce them; and develop methods to improve residual heat removal system reliability. In this regard, the DOE is encouraged to solicit university participation where appropriate.

With particular regard to plant safety, because of the complexity of some recent powerplant designs, the DOE is to analyze existing plant safety systems to determine if such safety systems, individually or in combination, detract from or enhance overall plant safety.

The Loss-of-Fluid Test facility (LOFT) is to be used to the fullest extent consistent with DOE and international nuclear reactor safety programs.

Three Mile Island R&D

The objectives of the Three Mile Island (TMI) activity are to develop the technology that will improve the capability of civilian nuclear powerplants to safely recover from accidents and to conduct relevant R&D that will substantially enhance nuclear powerplant safety and operation. There are two primary efforts within this ele-

ment: (1) TMI waste immobilization and reactor evaluation, and (2) data acquisition.

The data and information acquired will provide an improved basis for evaluating licensing criteria, analyzing causes and consequences of accidents, improving reliability of design and operation of LWR's and understanding how to deal with accident-generated abnormal reactor wastes.

In FY 1986, the DOE is to collect portions of the damaged core and various reactor internals for shipment to a DOE laboratory for examination. The DOE will also quantify and dispose of fuel in the reactor coolant system.

The primary data acquisition program effort in FY 1986 will be the off-site examination of the damaged TMI–2 reactor core at the Idaho National Engineering Laboratory (INEL) and other laboratories, as well as to transfer the information obtained to industry. The information will consist of data that is expected to be useful in determining future licensing criteria based on full-scale accident results as they apply to fuel rod damage, core degradation, fission product release, deposition and recriticality.

COMMITTEE ACTION

No change.

(2) ADVANCED CONVERTER REACTOR TECHNOLOGY

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE	Total authorization
Operating expenses:				
Advanced light water reactor	1,500	8,000	+3,000	11,000
Advanced high temperature gas-cooled reactor	31,058	25,000	+10,000	35,000
Liquid metal converter reactor	73,910	70,000	+11,615	81,615
Subtotal, operating	106,468	103,000	+24,615	127,615
Capital equipment:				
Advanced high temperature gas-cooled reactor	1,300	1,000	0	1,000
Liquid metal converter reactor	740	200	0	200
Subtotal, capital equipment	2,040	1,200	0	1,200
Construction:				
Mods to reactors	0	1,000	0	1,000
General plant projects	800	0	0	0
Subtotal, construction	800	1,000	0	1,000
Total	109,308	105,200	+24,615	129,815

Advanced light water reactors (LWR)

The Advanced Light Water Reactor program is directed toward the development of technology for the next generation of light water reactors. These newer reactors are expected to be available for commercial use in the late 1980's and 1990's. These designs will

be even safer, more economical, easier to build, easier to operate, more reliable and have longer plant lives.

The Department of Energy is to participate in the initiation of new advanced light water reactor designs and improvements by providing for "first-of-a-kind" R&D. While the Federal government should not be expected to develop products for the commercial market, new and innovative features for improved reactors can be encouraged by some government-sponsored R&D. If such designs are not developed, foreign nations which do have active markets will develop the marketable technologies.

The FY 1986 effort will be directed toward new concepts, including the Advanced Boiling Water Reactor, the NUPACK and the PIUS.

In addition, FY 1986 activities will be directed toward significant advancements in plant maintenance technology, including the more extensive use of robotics, as well as significantly different control room designs employing modern computer control systems and "artificial intelligence" concepts. The use of such concepts will allow plant operators to retrieve information on selectable levels of detail in hierarchically-organized displays of pictorial information. In addition, improved man-machine interfaces and state-of-the-art human factors engineering will be used to the fullest extent. This work will also include new and better instrumentation not previously approved by the NRC. Where appropriate, the DOE is encouraged to solicit university participation.

COMMITTEE ACTION

Increase of $3.0 million

The Committee added $3.0 million for the Small Modularized Power Plant program to support activities associated with the development of a highly reliable nuclear reactor in the 10 MWe range. This effort complements a DOD program.

Advanced high temperature gas reactor

The objective of this program is to design, develop, fabricate, transport, install and test a full-scale Modular High Temperature Gas Reactor. This reactor, based on the "side-by-side" concept, is to be a U.S. design in the 120 to 140 MWe size range. The reactor will consist of a "test article," that is, a Nuclear Steam Supply System (NSSS) together with the necessary controls, steam dump, condenser, feedwater heater and associated site construction. The NSSS will be suitable for conversion to a powerplant in the future through the addition of a turbine generator, switchyard, additional controls and on-site facilities, should they be provided by the private sector. After the completion of the preliminary design, a test site should be selected that will be acceptable to the NRC for vigorous testing under the most severe transient conditions to assure the validity of the extensive safety characteristics of this concept.

COMMITTEE ACTION

Increase of $10.0 million

The Committee added $10 million for a total of $36 million to provide for adequate funding to complete the Title I Preliminary Design in FY 1986, as well as to provide for the selection of the type of fuel and geometry. The Committee View provides explicit direction for the focused conduct of FY 1986 project design activity.

COMMITTEE VIEW

Modular high temperature gas-cooled reactor (MHTGR)

The Committee recognizes that the conceptual design of the Modular High Temperature Gas-Cooled Reactor (MHTGR) was completed in March 1985. Therefore, the Committee authorizes fiscal year 1986 funds for the completion of the Title I, Preliminary Design of the 120 to 140 MWe "nuclear steam supply system." The Committee directs that the DOE should proceed with: (1) the selection and preliminary design of the "nuclear fuel system" under the direction of the "Lead Laboratory" identified in P.L. 98–360, (2) pursuit of licensing application under the auspices of the Gas-Cooled Reactor Associates, and (3) commencement of conceptual design of a control room; all leading to the factory fabrication, field installation and performance testing of an MHTGR "Test Article." The Department of Energy should submit a brief definitive report to the appropriate Senate and House Committees by December 1985 which defines the accomplishments to date, as well as the organization, work breakdown structure, schedules, and estimated costs of the MHTGR program.

Liquid metal converter reactor

The Department has restructured the Nuclear Fission R&D program in FY 1986 to reflect a stronger emphasis on broad technological issues related to safety, design simplicity, licensing and international cooperation affecting the civilian nuclear power option in the United States. The Liquid Metal Reactor programs within the Nuclear Fission R&D program have been essentially restructured in accordance with the recommendations provided by the Committee during its FY 1985 authorization review (reference Rpt. 98–688, Part I). The Breeder Reactor Systems program has been redefined in terms of two subprograms, the Liquid Metal Converter Reactor program and the Advanced Breeder Reactor Technology program.

The Liquid Metal Converter Reactor subprogram includes the advanced liquid metal reactor design initiatives that were initiated in FY 1985. Elements of this activity comprise work related to safety, design standardization, fabrication and operational simplicity, and enhanced international cooperation. The program is structured into four areas. These are concepts and requirements development, power conversion technology, nuclear systems technology, and test facilities.

COMMITTEE ACTION

Increase of $11.615 million

The Committee recommends increasing the Liquid Metal Converter Reactor authorization level in FY 1986 by $11.615 million for the purpose of maintaining an advanced liquid metal reactor research and development activity at the Argonne National Laboratory, Argonne, Illinois. This laboratory has performed a critical role in supporting the design and safety analyses associated with implementing new innovative liquid metal reactor designs. A principal activity within this laboratory's research and development program has been the development of the Integral Fast Reactor (IFR). The additional funds will support continued development of this IFR concept and permit research and technology development of metal fuels reprocessing technology related to the pyro- and electro-processing technologies proposed for separating the various constituents of the plutonium/uranium/zirconium fuel elements. The added funds will enable the Argonne National Laboratory to continue its support for new liquid metal reactor design concepts.

(3) ADVANCED BREEDER REACTOR TECHNOLOGY

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Breeder component technology	14,000	6,700	+4,000	10,700
Fuel performance and supply	25,545	15,900	0	15,900
Reactor core technology	8,000	4,900	0	4,900
Test facilities	91,240	86,200	+1,500	87,700
Nuclear fuel cycle	12,391	17,000	+1,000	18,000
Increase to program operating expenses			+12,000	12,000
Total, operating expenses	151,176	130,700	+18,500	149,200
Capital equipment:				
Fuel performance and supply	11,425	2,000	0	2,000
Reactor core technology	1,165	2,320	0	2,320
Test facilities	1,245	4,480	0	4,480
Nuclear fuel cycle	840	0	0	0
Total, capital equipment	14,675	8,800	0	8,800
Construction:				
General plant projects (86-N-102)	0	1,800	0	1,800
General plant projects (85-N-600)	4,900	0	0	0
Mods to reactor, various locations	1,000	0	0	0
Total, construction	5,900	1,800	0	1,800
Total	171,751	141,300	+18,500	159,800

The Advanced Breeder Reactor Technology subprogram of the Civilian Reactor Development program continues the Department's efforts to develop the technology base necessary to support the implementation of the breeder reactor for future nuclear power re-

quirements. In FY 1986, this subprogram is comprised of two major activities: the Liquid Metal Fast Breeder Reactor technology and Nuclear Fuel Cycle technology.

Activities within Liquid Metal Fast Breeder Reactor Technology support technology evaluation studies related to the development of the liquid metal converter reactor concepts. Personnel and facilities located at the various laboratories that have traditionally supported breeder reactor research and development are utilized for both converter reactor and breeder reactor related endeavors. The advanced LMR design concepts, which are under the purview of industrial vendors, are supported in their design analyses by both Liquid Metal Reactor program elements.

The Liquid Metal Fast Breeder Reactor Technology activity is comprised of four elements. These are breeder component technology, which in FY 1986 will initiate evaluation of steam generator performance parameters; fuel performance and supply, which is directed towards the development of economically competitive and reliable fuel, blanket and control assemblies for use in the liquid metal converter reactor and fast breeder reactor systems; reactor core technology, providing for the evaluation and proof-of-concept testing of the feasibility of the advanced breeder core systems; and test facilities, which incorporates all the major breeder reactor facilities located at the Argonne National Laboratory in Idaho, the Hanford Engineering Development Laboratory in Washington, and the Energy Technology Engineering Center in California.

COMMITTEE ACTION

Increase of $18.5 million

The Committee recommends an additional $4 million be authorized to maintain a base level of materials and structures activity in support of advanced technology developments for the liquid metal reactor at the Oak Ridge National Laboratory. The Committee also recommends an addition of $1.5 million to support operation of the Zero Power Plutonium Reactor (ZPPR) at the Idaho National Engineering Laboratory. These funds are to be combined with $800,000 provided within the Administration's FY 1986 budget request for this activity. Funds are to be used to maintain operation of this facility in support of international cooperative efforts. It is the Committee's understanding that the Japanese plan to provide $500,000 additional support for research activities within the Zero Power Plutonium Reactor facility in FY 1986. The Department is urged to encourage this support and to seek additional cooperative funding from international participants as appropriate. An additional $12 million is authorized for the Hanford Engineering Development Laboratory for purposes of maintaining the operation of the Fast Flux Test Facility for the Core Demonstration Experiment (CDE) and the continuation of the Secure Automated Fabrication (SAF) Fuel Line and other breeder technology activities. Also an additional $1 million is recommended for the thorium fuel cycle to integrate volume reduction burner design with the off-gas system.

(4) WATER-COOLED BREEDER REACTOR TECHNOLOGY PROGRAM

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Defueling	8,000	5,100	−4,100	1,000
Core evaluation	17,970	14,600	−10,900	3,700
Total, operating expenses	25,970	19,700	−15,000	4,700

The Water-Cooled Breeder Reactor program, under the purview of the Director, Naval Nuclear Propulsion Program, is intended to demonstrate the potential for replacing pressurized water reactor cores with a thorium-oxide core that has breeding potential. The program was operated at the Shippingport reactor in Pennsylvania and was terminated in October, 1982. Present activities are directed towards defueling the Shippingport reactor and evaluating the thorium oxide core for purposes of determining the breeding ratio.

The Committee has for the past several years taken the position that this activity has no bearing on the present direction of the advanced nuclear fission R&D activities. For this reason, the Committee has continuously recommended appreciable reductions in this program until such time as the industry indicates a strong desire to implement or to, in any way, make use of the technology developed within this activity.

COMMITTEE ACTION

Reduction of $15 million

The Committee recommends a reduction of $15 million from the Water-Cooled Breeder Reactor program element in FY 1986. These funds are to be redirected for purposes of accommodating the Committee's programmatic priorities in the nuclear fission research and development program. In order to meet the requirements for terminating, in an effective manner, the remaining activities within the Water-Cooled Breeder Reactor program element, the Committee mandates cost-sharing from the Naval Reactor Development program for the completion of defueling and core evaluation tasks yet remaining over the next two and one-half years.

(5) CIVILIAN REACTOR DEVELOPMENT PROGRAM SUPPORT

[In thousands of dollars]

	Fiscal year—		Committee Action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Reactor development research support	9,714	11,250	0	11,250
Safeguards and program assurance	5,100	5,750	0	5,750

[In thousands of dollars]

	Fiscal year—		Committee Action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Reduced enrichment for research and test reactors	4,692	5,200	0	5,200
Program direction	9,010	7,400	0	7,400
Subtotal, operating	28,516	29,600	0	29,600
Construction:				
ANL–West (85–N–602)	500	900	0	900
Safeguards and security improvements (83–N–334)	600	0	0	0
Subtotal, construction	1,100	900	0	900
Total	29,616	30,500	0	30,500

The Civilian Reactor Development Program Support task is comprised of activities that are generic to the light water reactor technology, advanced converter reactor technology, liquid metal fast breeder reactor technology and water-cooled breeder reactor technology programs. Activities under this subprogram element include reactor development research support, safeguards and program assurance, reduced enrichment for research and test reactors and program direction. Also included are technology transfer programs that encourage the application of new technologies, support for universities and national private laboratories for new and innovative technological breakthroughs in the nuclear fission area, and support of studies with foreign partners to advance the technology and reduce costs. Included within this subprogram element are the traditional activities associated with enhanced safeguards and program assurance support that includes physical security systems, materials control and accountability at the laboratories. The reduced enrichment for research and test reactors provides funds to support research activities related to replacing high-enriched fuels at research reactors with a lower-enriched uranium fuel. The Committee continues to support the Department's efforts to enhance university participation in the mainstream nuclear fission research and development activities funded by the government.

COMMITTEE ACTION

No change.

b. Advanced Nuclear Systems

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Space and special applications	25,250	17,455	+5,000	22,455
Space reactor technology (SP–100)	8,850	12,610	0	12,610

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
North warning power project	0	2,500	0	2,500
Program direction	1,050	1,235	0	1,235
Subtotal, operating	35,150	33,800	+5,000	38,800
Capital equipment:				
Space and special applications	1,500	1,700	0	1,700
Space reactor technology (SP–100)	50	2,000	0	2,000
Subtotal, capital equipment	1,550	3,700	0	3,700
Construction: Space reactor technology (SP–100) 86–N–105, facility modification (subtotal)	0	2,000	0	2,000
Total	36,700	39,500	+5,000	44,500

The Advanced Nuclear Systems program is comprised of two elements. These are the Space and Special Applications and Space Reactor Technology activities. Within the Space and Special Applications area, work directed toward the support of the development and fabrication of flight-qualified radioisotope thermoelectric generators for NASA's Galileo and Ulysses space missions is accomplished. Other activities within this program element include the development of general purpose heat sources for other space and terrestrial applications. The Space Reactor Technology program element involves the research and development associated with the SP–100 program. This activity will provide a compact nuclear reactor suitable for providing hundreds of kilowatts of electric power for advanced civilian and defense-related space missions. In its FY 1986 budget request, the Department restructured this activity into a new program element called Defense Nuclear Energy programs. The Committee has retained the space nuclear activity under the Advanced Nuclear Systems program.

In FY 1985, activities within the SP–100 program involved the preliminary design and technology development activities associated with the selection of a reactor design concept planned for July, 1986. Subsequent activities will involve the initiation of a ground engineering system development program. Continued cooperative support is anticipated from the Department of Defense and NASA.

The Committee recognizes that the SP–100 program represents a substantive new direction for long-term nuclear fission research and development programs. The development of nuclear power systems for application to space missions affords the nation an opportunity to bring its best talents to a new technology application. As such, the Committee encourages the Department to work with university representatives, such as heads of nuclear engineering departments, to identify an appropriate role for universities as contributors to the long-term research needs for reactor systems applicable to civilian and defense-related applications of space nuclear power.

COMMITTEE ACTION

Increase of $5 million

The Committee recommends an increase of $5 million for the purpose of continuing the research and development activities associated with advanced radioisotope thermoelectric generator activities. The Committee directs $2 million to the Oak Ridge National Laboratory for purposes of maintaining an advanced materials R&D program related to the development of future RTG applications. The balance of $3 million is to be used to maintain support for industry contractor programs in advanced RTG development. This includes work associated with the development of advanced thermoelectric materials and the development of other concepts which employ general purpose heat sources, such as the modular isotope generator and the dynamic isotope power systems.

The Committee also encourages the Department to continue technology assessment and development efforts in the principal areas of thermionics, thermoelectrics, and dynamic power conversion cycles (e.g., Stirling, Brayton and Rankine) at levels appropriate to assuring that a prudent evaluation of these technologies and their applicability to space power applications will be forthcoming.

c. Nuclear Waste Technology

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Waste treatment	6,000	6,000	+1,000	7,000
Civilian byproducts and beneficial uses	0	0	+5,000	5,000
Subtotal, operating	6,000	6,000	+6,000	12,000
Capital equipment waste treatment (subtotal)	300	450	0	450
Total	6,300	6,450	+6,000	12,450

Waste treatment

The goal of the Waste Treatment program is to develop and demonstrate technologies for the treatment and immobilization of nuclear fuel cycle radioactive wastes in a form acceptable for transportation, storage and ultimate disposal in a licensed repository. This program involves identifying and characterizing the types of waste requiring treatment; understanding the regulatory requirements; developing the technologies to treat wastes; testing the developed technology to determine its reliability, efficiency, and adequacy in meeting environmental, safety, and health protection requirements; and providing a technical resource for other programs in designing, constructing, and operating treatment systems for specific wastes of interest of the Department.

Food irradiation

The Committee initiated a Civilian Byproducts and Beneficial Uses Activity within the Nuclear Waste Technology program. This major initiative will emphasize food irradiation and directs the Department of Energy to establish and lead in close cooperation with the Department of Agriculture, a civilian integrated byproducts program under the Assistant Secretary for Nuclear Energy. This program is to include all aspects of byproduct work including application technology development and demonstration, and technology for the supply of byproducts. The emphasis shall be on food irradiation and other food-related applications.

A key objective of the program shall be demonstration of selected applications, particularly support for food irradiators. Support of irradiators should be aimed at maximizing technology transfer to the private sector and to foreign areas such as the Caribbean Basin and Central America in cooperation with the Agency for International Development. The program shall also include design and fabrication of additional demonstration irradiators for agricultural commodities. As part of this program, a food irradiation information network shall be established to facilitate the sharing of information.

The Civilian Integrated Byproducts program shall further evaluate and develop sources of supply and evaluate the feasibility of machine-generated irradiation and X-ray treatment. Generation of irradiation and source material in DOE civilian facilities shall be studied. DOE should also evaluate and develop a management strategy for existing and future byproducts. The civilian DOE Nuclear Energy program will be responsible for control and distribution of byproducts and will receive support from DOE Defense programs in areas of supply, handling, and ultimate disposal of defense byproducts.

COMMITTEE ACTION

Increase of $6 million:

Increase of $1 million for the development of an advanced waste form.

Increase of $5 million for food irradiation.

d. Civilian Radioactive Waste R&D

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Spent fuel storage development	11,625	7,800	0	7,800
Alternate disposal concepts	9,975	10,500	0	10,500
Generic methods and supporting studies	2,021	1,650	0	1,650
Program direction	266	325	0	325
Subtotal, operating	23,887	20,275	0	20,275

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Capital equipment:				
Spent fuel storage development	1,000	1,100	0	1,100
Alternate disposal concepts	1,500	2,000	0	2,000
Subtotal, capital equipment	2,500	3,100	0	3,100
Total	26,387	23,375	0	23,375

The objective of the Civilian Radioactive Waste Research and Development program is to provide for spent nuclear fuel storage research and development. Program activities include the development of data and demonstration of dry storage of spent nuclear fuel and rod consolidation; research, development and investigation of alternative means for the permanent disposal of nuclear waste; and technical assistance to non-nuclear weapon states in the fields of spent nuclear fuel storage and disposal.

COMMITTEE ACTION

No change.

4. MAGNETIC FUSION ENERGY

[In thousands of dollars]

	Fiscal year—		Committee Action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Applied plasma physics	82,491	78,100		78,100
Confinement systems	187,019	184,900		184,900
Development and technology	67,900	62,500		62,500
Planning and projects	32,799	16,900		16,900
Program direction	4,090	4,000		4,000
Add to program operating expenses			+25,000	25,000
Subtotal, operating expenses	374,299	346,400	+25,000	371,400
Capital equipment:				
Applied plasma physics	3,370	6,400	0	6,400
Confinement systems	16,700	15,100	0	15,100
Development and technology	6,300	5,000	0	5,000
Planning and projects	3,800	3,950	0	3,950
Subtotal, capital equipment	30,170	30,450	0	30,450
Construction:				
General plant projects (86–R–GPP)	0	9,108	0	9,108
General plant projects (85–GPP)	9,400	0	0	0
Mirror fusion test facility (MFTF–B)	20,100	4,042	0	4,042
Fusion materials test facility (FMIT)	3,000	0	0	0
Subtotal, construction	32,500	13,150	0	13,150
Total	436,969	390,000	+25,000	415,000

The Magnetic Fusion Energy program is a national research effort to develop a major new energy source for this country in the next century. Fusion energy promises several attractive features, including intrinsic safety and minimum environmental problems. Fusion would utilize a vast fuel reserve that is inexpensive, readily available, and could have multiple uses such as generation of electricity, production of fuel for nuclear reactors, and high-grade heat for industrial use. Realization of these potential benefits at an economically attractive price requires development in a number of areas of physics and technology. The goal of the Department's Magnetic Fusion Energy program is to develop the scientific and technological base required for an attractive fusion energy option. This includes demonstrating the technical viability and basic engineering feasibility of fusion to the point where we can predict its expected economic and environmental performance.

The National Energy Policy Plan recognizes the importance of having a flexible energy supply system which avoids undue dependence on any single source of supply. Since decades are required to develop significant new energy sources to provide this flexibility, it is important to maintain progress on potential long-term solutions, such as fusion. Thus, the mission of the fusion program continues to be important even though the urgency to develop new sources of energy has decreased.

In response to budget restraints, the Magnetic Fusion Energy program has attempted to maintain a slower pace across a broad front of technology areas rather than focusing on the timely development of the scientific base directly associated with the physics of burning plasmas. The additional experience provided by this key generic technology activity is essential for the confident assessment of any confinement concept. Without such experience and resulting data, the ability to determine an appropriate balance in the selection and development of alternative concepts may be seriously impaired.

COMMITTEE ACTION

Increase of $25 million

The Committee added $25 million, i.e. just 6%, to the Magnetic Fusion Energy budget to provide the DOE with additional flexibility essential to maintaining a strong scientific and engineering effort that will be recognized internationally. This effort should provide a base for future international negotiations on the next major, high-cost fusion device. In addition, this increase is intended to support the planning and R&D associated with a near-term, lower-cost (less than $500 million) U.S. ignition device. DOE is in-

structed to submit a report to the Committee by August 1, 1985, outlining the schedule, costs and benefits of a near-term, lower-cost ignition experiment.

In addition, the DOE is to report to the Committee by August 1, 1985 on the feasibility of a "Fusion Research Center," located at a DOE site with supporting facilities as suggested in testimony received on March 8, 1985.

COMMITTEE VIEW

Magnetic fusion energy

The Committee believes that there is a need for a near-term focus in the Magnetic Fusion Energy program. One possible approach to providing such a focus is through the design and fabrication of a lower-cost ignition device to provide experience with a burning plasma. The DOE should provide the Committee with a report on the prospects for such a lower-cost ignition device by August 1, 1985. This report should include the device parameters, project costs and schedule such that planning for this program focus can be incorporated in the FY 1987 budget submission to the Congress. The Committee further believes that international cooperation should be encouraged for a joint undertaking to design and construct a more ambitious fusion device which more nearly approaches the plasma conditions, as well as the engineering features, of a test reactor. The Committee recognizes that a cooperative agreement on such an ambitious project may take three to five years to complete, but it may be the only avenue to maintaining technical momentum in fusion development beyond the lower-cost ignition project.

5. ELECTRIC ENERGY SYSTEMS

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Electric field effects	4,700	3,000	+1,700	4,700
Reliability R&D	4,500	3,000	+1,500	4,500
Systems technology	10,683	3,630	+3,938	7,568
Program direction	432	370	+62	432
Subtotal, operating	20,315	10,000	+7,200	17,200
Capital equipment: Systems technology (subtotal)	300	0	+300	300
Total	20,615	10,000	+7,500	17,500

The Electric Energy Systems program supports research aimed at increasing the efficiency, reliability, and adaptability of our nation's electric power transmission and distribution systems. The R&D programs principally focus on: determining the biological health effects of exposure of high-voltage electric fields; providing technical options that will enhance the reliability of the electric network under normal and emergency situations, particularly that

of an electromagnetic pulse; and improving system efficiency through the development of new materials, advanced controls, and new design concepts.

COMMITTEE ACTION

Increase of $7.5 million

The Committee recommends an increase of $7.5 million above the proposed Administration level of $10.0 million. The Committee believes that endorsement of the lower funding level would severely restrict these programs and necessitate the premature termination of research activities. These research programs are of national importance and could ultimately affect the cost of electricity to consumers and the security of U.S. electric systems. To obtain needed research results requires a firm commitment at a funding level which can sustain project continuity.

The Committee recommends that the additional $7.5 million be distributed as follows: In the Electric Field Effects category, an additional $1.7 million is to be used to continue biological research on electric field effects and maintain a constant level of participation in a joint Japanese/American program on effects. Within the Reliability R&D category, an increase of $1.5 million is recommended including $1.2 million to enhance work on the Electromagnetic Pulse (EMP) effects and $300,000 for Failure Mechanisms work on aging of dielectric insulating materials. These amounts will maintain a consistent level of activity in these subprograms.

The Systems Technology category was hardest hit in the Administration budget proposal with a recommended decrease in funding of $7.0 million. Of the seven major elements within the Systems Technology category, four were recommended for termination and three were recommended for funding reductions. The Committee recommends restoring $1.0 million for High Voltage Direct Current (HVDC) and $1.0 million for New Materials which will allow a return to a modest level of activity. $900,000 was added in Automation Processing concepts to continue the Athens project. An additional $500,000 is recommended in support of the Battery Energy Storage Test (BEST) facility. This additional funding will allow DOE to continue its efforts in cooperation with EPRI and New Jersey Public Service Electric and Gas Company. The Committee believes that this demonstration work is important and encourages the Department of Energy to continue its participation. Also an additional $500,000 for Systems and Management will go toward facilitating technology transfer and continuing the activities which support a small business innovation research program and a university grant program.

$300,000 is added for capital equipment to purchase small laboratory and experimental equipment, such as electric and magnetic probes, digital sensors and analytical devices.

Finally, an additional $62,000 is added to Program Direction which will allow one additional man year for the Electric Energy Systems Program.

6. ENERGY STORAGE SYSTEMS

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Battery storage	16,259	12,500	+2,300	14,800
Thermal and mechanical storage	2,285	3,060	+500	3,560
Program direction	453	340	+113	453
Subtotal, operating	18,997	15,900	+2,913	18,813
Capital equipment: Battery storage subtotal	500	200	+300	500
Total	19,497	16,100	+3,213	19,313

The Energy Storage Systems program shares a common goal with the Electric Energy Systems program of developing a technology base for providing a continuous supply of electric power in a safe, reliable and efficient manner. The program is intended to bridge the gap between fundamental research and private sector product development and it supports end-use applications which include electric vehicles, utility load leveling, and building and industrial conservation. The program is divided into two major subcategories, electrochemical energy storage and thermal and mechanical storage.

Electrochemical storage (battery storage) is intended to provide advanced batteries and conversion technologies that can facilitate the substitution of domestic energy resources for imported energy resources and allow more efficient use of our domestic resources. The program has two main subactivities: technology base research, which includes research on new and improved systems which are cross-cutting activities to support the development of all existing energy storage and conversion systems. The second subcategory is advanced development and testing which focuses on sodium-sulfur and zinc-bromine battery and development.

The goal of the Thermal Energy Storage program is to develop technology which will enable the storage of available heat for use at a later time. This facet of the storage program is particularly attractive for use in load leveling and contains work on phase change and latent heat technologies.

COMMITTEE ACTION

Increase of $3.213 million

The Committee recommends an increase of $3.2 million over the proposed Administration level of $16.1 million. The Committee believes that the additional funding, which will bring this program budget to slightly less than the FY 1985 appropriated level of $19.5 million, will provide some continuity to these programs which is necessary to conduct a responsible research and development program.

The Committee recommends that the additional $3.2 million be allocated as follows: In the Electrochemical Storage program, an increase of $2.3 million for continued research on corrosion research, fuel cells for transportation and technological and economic analyses, all toward the goal of developing and testing advanced batteries. The Committee recommends that continued emphasis be placed on the development of the zinc-bromine battery, and encourages the continuation of DOE's role in a cooperative effort with EPRI and the private sector in this effort and provides an additional $1.0 million for this purpose. It is also recommended that an additional $800,000 be allocated for conversion system research and $500,000 for corrosion research. Within the Thermal Energy Storage activity, the Committee recommends an increase of $500,000. This is intended to be a supplement to the funding level already provided for continuing development work in molten salt thermal energy storage media systems.

Also within the Energy Storage account, the Committee added $300,000 for capital equipment to support research at experimental facilities at the National Laboratories and the National Battery Test Facility at Argonne National Laboratory, and an additional $113,000 was included to maintain adequate staff levels for these programs.

7. SUPPORTING RESEARCH AND TECHNICAL ANALYSIS

[In thousands of dollars]

Supporting research and technical analysis	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE request	Change to DOE request	Recommendations
Operating expenses:				
Basic energy sciences	341,471	343,181	+8,500	351,681
Energy research analysis	3,000	2,700	0	2,700
University research support	11,192	9,700	0	9,700
University research instrumentation	5,000	4,500	0	4,500
Advisory and oversight program direction	2,831	2,900	0	2,900
Policy and management—energy research	530	500	0	500
Multiprogram laboratories facilities support	0	12,900	0	12,900
Subtotal, operating expenses	364,024	376,381	+8,500	384,881
Capital equipment:				
Basic energy sciences	31,120	30,494	0	30,494
Multiprogram laboratories facilities support	0	1,000	0	1,000
Subtotal, capital equipment	31,120	31,494	0	31,494
Construction:				
Basic energy sciences	49,970	36,125	+500	36,625
Multiprogram laboratories and facilities support	33,200	37,300	0	37,300
Subtotal, construction	83,170	73,425	+500	73,925
Subtotal, supporting research	478,314	481,300	+9,000	490,300
General reduction	0	0	−9,000	−9,000
Total, supporting research and technical analysis	478,314	481,300	0	481,300

Seven programs comprise the Office of Energy Research's portion of the Supporting Research and Technical Analysis category of the

agency's budget: (1) Basic Energy Sciences; (2) Energy Research Analysis; (3) Advisory and Oversight Program Direction; (4) University Research Support; (5) University Research Instrumentation; (6) Policy and Management—Energy Research; and (7) Multiprogram Laboratories Facilities Support. The Department's fiscal year 1986 request for Supporting Research and Technical Analysis totals $481.3 million, an increase of $3.0 million from the fiscal year 1985 appropriation of $478.3 million. This request includes $376.4 million in operating expenses (an increase of $12.4 million from the fiscal year 1985 appropriation of $364.0 million), $31.5 million for capital equipment (up $400,000 from the fiscal year 1985 appropriation of $31.1 million), and $73.4 million for construction (a decrease of $9.8 million from the fiscal year 1985 appropriation of $83.2 million).

SUMMARY OF COMMITTEE ACTIONS

The Committee recommendations authorize a total of $481,300,000 for Supporting Research and Technical Analysis programs, which is the Department's request.

In the specific subprograms, the Committee recommendations resulting in funding changes are as follows:

Operating expenses

Basic energy sciences.—(1) Increase of $8,500,000 to fulfill the second year of the Department's contractual agreement with the Supercomputer Computational Research Institute; and (2) within available funds, an additional $1,500,000 is provided for operations of the Weapons Neutron/Proton Storage Ring.

Plant and capital equipment

Basic energy sciences.—Increase of $500,000 to provide: (1) $1,000,000 to initiate the first year of a three-year construction project totalling $18,400,000 to make a world-class neutron scattering user facility out of the Weapons Neutron Research/Proton Storage Ring (WNR/PSR) complex at Los Alamos National Laboratory, and (2) $1,400,000 for the Ion Collision Physics Facility.

General reduction

A general reduction of $9,000,000 is to be applied across the Supporting Research and Technical Analysis programs at the Department's discretion to assure that funds not explicitly identified by the Committee may be used for the remaining highest priority programs, with the exception that this reduction shall not be applied to any ongoing or planned university project sponsored by the Department.

COMMITTEE VIEWS

Basic energy sciences

The Committee notes that the July 24, 1984 report of the National Research Council's Major Materials Facilities Committee recommends that "site-independent design should begin immediately" for a 6-GeV synchrotron radiation facility and an advanced steady

state neutron facility. These facilities will provide probes which will illuminate a broad spectrum of scientific opportunities in solid state physics, materials science, chemistry and biology. The Committee recognizes the need for these advanced research facilities to place the U.S. at the forefront of vital areas of science, and expects that, within available funds, the Department will fund site-independent R&D and engineering design for these facilities in fiscal year 1986. The Committee further expects the Department's submission for fiscal year 1987 to contain a plan by which these two major research facilities will be realized, and to include a request for the necessary preconstruction R&D and design funds in its submission.

University research support

The Committee recognizes that support for research programs in computational, physical, and materials sciences at minority graduate universities is important. The Committee recommends that the Department of Energy provide appropriate assistance to Atlanta University, and other such institutions, in the development of its graduate science and technology research center. The Department is directed to submit definitive projects to the Committee as soon as they are available, for review and applicable support.

COMMITTEE ACTIONS

Basic energy sciences

Materials sciences.—The Committee directs the Department to proceed as quickly as possible to establish the Weapons Neutron Research/Proton Storage Ring (WNR/PSR) complex at Los Alamos National Laboratory as a world-class neutron scattering user facility. Accordingly, within available funds for Materials Sciences, the Department shall provide an additional $1,500,000 for operations of the WNR/PSR in fiscal year 1986. None of this $1,500,000 shall be taken from previously planned fiscal year 1986 research or capital equipment funds for the WNR/PSR.

The Committee is aware that the Department is providing expertise to the National Science Foundation in the assessment of the Aladdin synchrotron radiation device at the University of Wisconsin. It appears that Aladdin will have to undergo extensive modification to reach its full potential. Accordingly, the Committee directs the Department to carefully assess and report to the Committee by August 1, 1985, the feasibility and cost of upgrading Aladdin so that it could fulfill the recommendation of the National Research Council's Major Materials Facilities Committee for a 1 to 2 GeV Synchrotron Radiation Facility "centered around insertion devices but optimized for the vacuum ultraviolet (VUV) and soft x-ray region."

Applied mathematical sciences.—The Committee recommendation provides an additional $8.5 million to fulfill the second year of the Department of Energy's five-year contractual agreement with the Supercomputer Computational Research Institute.

Geosciences.—The Congress, in its consideration last session of S. Res. 439, identified the Continental Scientific Drilling Program as a high priority interagency research program involving the Depart-

ment of Energy, the National Science Foundation, and the U.S. Geological Survey. An Interagency Accord on Continental Scientific Drilling, dated April 2, 1984, serves as the basis for a coordinated national drilling program. These agencies are directed to prepare an implementation plan for submission to the Congress prior to September 30, 1985. This plan should address joint management and funding of drilling, linkage among research objectives of the participating agencies, direct research and drilling costs, and should identify relative priorities, parallel efforts, synergism among agency goals, and opportunities for industrial cooperation. The implementation plan should serve to identify duplication of efforts and ensure that gaps in the overall program are minimized.

Planning.—The Committee is pleased that the Department is realizing the need for long-range planning and priority setting for the Basic Energy Sciences program, and that such a preliminary plan has been prepared and disseminated by the Materials Sciences Division of the Office of Basic Energy Sciences. However, the Committee believes that much more effort needs to be applied to the planning activity. Consequently, the Committee directs the Department, in conjunction with the appropriate scientific advisory groups, to develop and submit by December 1, 1985, a long-range plan for overall research priorities, facilities construction and operation, and facility-based research.

Construction.—The Committee's recommendations for Basic Energy Sciences construction add a total of $500,000 to the Department's request to provide: (1) an increase of $1,000,000 to initiate the first year of a three-year construction project totalling $18,400,000 to make a world-class neutron scattering user facility out of the Weapons Neutron Research/Proton Storage Ring (WNR/PSR) complex at Los Alamos National Laboratory, and (2) $1,400,000 for the Ion Collision Physics Facility, a decrease of $500,000 from the Department's request.

General reduction

The Committee directs the Department to apply a general reduction of $9,000,000 across the Supporting Research and Technical Analysis programs to maintain the Department's fiscal year 1986 request level at $481,300,000. This general reduction may be applied at the Department's discretion to assure that the funds not explicitly identified by the Committee may be used for the remaining highest priority programs, with the exception that this reduction shall not be applied to any ongoing or planned university research project sponsored by the Department.

DETAILED SUMMARY

Details of the Committee's recommendations, current year estimates and the budget request are shown on the following tables:

[In thousands of dollars]

Supporting research and technical analysis	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE request	Change to DOE request	Recommendations
BASIC ENERGY SCIENCES				
Operating expenses:				
Materials sciences	133,055	138,496	0	138,496
Chemical sciences	79,495	79,495	0	79,495
Nuclear sciences	40,350	43,338	0	43,338
Applied mathematical sciences	35,074	28,020	+8,500	36,520
Engineering and geosciences	26,675	26,675	0	26,675
Advanced energy projects	10,602	10,602	0	10,602
Biological energy research	12,455	12,455	0	12,455
Program direction	3,765	4,100	0	4,100
Subtotal, operating expenses	341,471	343,181	+8,500	351,681
Capital equipment	31,120	30,494	0	30,494
Construction:				
84–ER–111, Beam lines and support area construction, National Synchrotron Light Source, Brookhaven National Laboratory	10,000	7,200	0	7,200
84–ER–112, Center for Advanced Materials, Lawrence Berkeley Laboratory	10,790	17,440	0	17,440
84–ER–113, Stanford Synchrotron Radiation Lab Enhancement, Stanford Linear Accelerator Center	9,130	2,560	0	2,560
85–ER–403, Ion Collision Facility, Kansas State University, Manhattaan, KA	2,000	1,900	−500	1,400
86–R–111, Neutron scattering experimental halls, Los Alamos	0	0	+1,000	1,000
86–R–400, General plant projects, various locations	[1] 0	4,030	0	4,030
86–R–401, Accelerator and reactor improvements and modifications, various locations	[2] 0	2,995	0	2,995
Total		36,125	+500	36,625
Total program	422,561	409,800	+9,000	418,800
ENERGY RESEARCH ANALYSIS				
Operating expenses	3,000	2,700	0	2,700
UNIVERSITY RESEARCH SUPPORT				
Operating expenses:				
University laboratory cooperative research	6,550	6,800	8	6,800
University reactor fuel assistance	3,892	1,900	0	1,900
Energy manpower assessments	450	450	0	450
Energy education and training	300	550	0	550
Subtotal, University research support	11,192	9,700	0	9,700
UNIVERSITY RESEARCH INSTRUMENTATION				
Operating expenses	5,000	4,500	0	4,500
ADVISORY AND OVERSIGHT PROGRAM DIRECTION				
Operating expenses	2,831	2,900	0	2,900
POLICY AND MANAGEMENT—ENERGY RESEARCH				
Operating expenses	530	500	0	500
MULTIPROGRAM LABORATORIES FACILITIES SUPPORT				
Operating expenses: Environmental compliance [3]	0	12,900	0	12,900
Capital equipment: Environmental compliance	0	1,000	0	1,000
Construction:				
Environmental compliance	0	8,000	0	8,000

[In thousands of dollars]

Supporting research and technical analysis	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE request	Change to DOE request	Recommendations
Multiprogram general purpose facilities construction:				
80–ES–11, Laboratory facility, Idaho National Engineering Laboratory	750	750	0	750
84–ER–103, Road repair, Richland, Lawrence Brekeley, Idaho and Argonne National Laboratory	10,250	4,400	0	4,400
85–R–701, Central chilled water facility, Brookhaven	2,200	7,100	0	7,100
85–R–702, Replace laboratory roofs, Argonne National Laboratory	3,308	3,100	0	3,100
85–R–703, Electrical distribution system restoration, Oak Ridge National Laboratory	800	1,400	0	1,400
85–R–706, Medical facility replacement, Lawrence Livermore	500	2,800	0	2,800
85–R–707, Replace site fire alarm system, Richland	1,300	3,550	0	3,550
85–R–709, Establish central chilled water plant, Argonne	0	1,000	0	1,000
85–R–711, Upgrade environmental monitoring, Oak Ridge National Laboratory	1,000	2,500	0	2,500
85–R–712, Modify central chilled water plant, Oak Ridge	1,000	2,200	0	2,200
86–R–726, Fire protection improvements, Brookhaven	0	500	0	500
86–R–800, Environmental compliance, general plant projects, Oak Ridge	0	5,000	0	5,000
86–R–801, Nonradiological process waste treatment plant (design only)	0	3,000	0	3,000
Subtotal, construction	33,200	37,300	0	37,300
Total, multiprogram laboratories facilities support	33,200	51,200	0	51,200
Subtotal, supporting research and technical analysis:				
Operating expenses	364,024	376,381	+8,500	384,881
Capital equipment	31,120	31,494	0	31,494
Construction	83,170	73,425	+500	73,925
General reduction	0	0	−9,000	−9,000
Total, supporting research and technical analysis	478,314	481,300	0	481,300

[1] $3.75 million appropriated for GPP in fiscal year 1985 (85–ER–400).
[2] $2.4 million appropriated for ARIM in fiscal year 1985 (85–ER–401).
[3] Pending approval of a reprogramming request, $5.4 million will be devoted to this activity in fiscal year 1985.

8. ENVIRONMENTAL R&D

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Environment, safety, and health	37,088	38,066	0	38,066
Biological/environmental research	179,660	175,300	+4,000	179,300
Liquefied spill test facility	2,000	1,750	0	1,750
Subtotal, operating expenses	218,748	215,116	+4,000	219,116
Capital equipment	9,436	9,250	0	9,250
Construction	3,000	3,250	0	3,250
Total program	231,184	227,616	+4,000	231,616

The Department of Energy's (DOE) environmental program was established to assure that the environmental research, assessment, and control issues related to current and developing energy technologies are addressed effectively. The program is divided into three major categories: Environment, Safety and Health; Biological and Environmental Research; and the Liquefied Gaseous Fuels Spill Test Facility.

ENVIRONMENT, SAFETY AND HEALTH

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes in DOE request	Total authorization
Operating expenses:				
Nuclear safety	17,700	17,580	0	17,580
Quality assurance and standards	950	950	0	950
Operating safety	9,200	9,145	0	9,145
Environmental compliance	1,700	1,700	0	1,700
Environmental analysis	2,600	2,565	0	2,565
Program direction	4,938	6,126	0	6,126
Subtotal, operating expenses	37,088	38,066	0	38,066
Capital equipment	1,500	1,500	0	1,500
Total program	38,588	39,566	0	39,566

The Environment, Safety and Health (ES&H) program was established to assure protection of the environment, safety of DOE workers and the public, and protection of DOE property. The ES&H program implements these goals by defining DOE policy, providing guidance and technical assistance, performing safety related research of a generic nature and performing independent overview and assessment.

Recently, the principal focus of the ES&H program has been sharpened to emphasize more strongly environmental protection, safety, and health protection and quality assurance in DOE operations. The responsibilities of the program are met through the activities discussed below.

1. Nuclear safety.—The nuclear safety program assures an independent overview of the Department's nuclear facilities. The staffing levels of this program were expanded in FY 1985 to enhance the Department's emergency response capability and to upgrade nuclear facility safety.

COMMITTEE VIEW

The Committee approves of the high priority placed on improving the reliability of radiation dosimeters which are used to assess radiation exposure levels of DOE workers. Better dose assessments are required in view of anticipated changes in radiation protection guidance by the Environmental Protection Agency and increased dose estimations of neutron radiation.

2. Quality assurance and standards.—The objective of the quality assurance program is to provide a system of management controls and procedures to assure that research and production activities

conform to requirements established by the Department. Assurance is provided principally through internal policy coordination and performance of overview and management appraisals.

3. Operational safety.—The goal of the operational safety program is to assure that DOE is in conformance with environmental protection, safety, and health protection policies, laws and principles, and that the Department maintains high quality performance levels in its operations. The overall performance of DOE in regard to environment, safety and health is assessed through collection and analysis of monitoring and incident data for DOE field and headquarters operations.

4. Environmental compliance.—The environmental compliance program conducts independent reviews to assure Department compliance with the National Environmental Policy Act (NEPA) and other environmental requirements bearing on project development. NEPA and implementing regulations require Federal agencies to prepare and consider in decision-making NEPA review documents i.e., environmental impact statements and environmental assessments.

5. Environmental analysis.—The environmental analysis program provides a Departmental focal point for analysis of current and emerging environmental issues, laws, regulations, and technologies that impact U.S. energy supply and Departmental policies, plans, programs, and facilities. This program analyzes and coordinates the Department response to regulatory proposals that may impact energy activities.

6. Program direction.—This program includes the personnel costs for 101 staff years required to accomplish the Federal staff responsibilities of the Environment, Safety, and Health program.

7. Capital equipment.—This program supports ES&H's operating activities conducted at seven national laboratories and several other dedicated Department-wide contractors. A wide variety of capital equipment is required to pursue the diverse program of research and assessment of environment, safety and health impacts of energy production.

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes in DOE request	Total authority
Operating expenses:				
Source and dose determination	15,694	15,533	0	15,533
Environmental processes and effects	32,943	31,770	0	31,770
Health effects	64,066	62,091	+1,000	63,091
Basic biology	28,295	28,000	0	28,000
Nuclear medicine	21,792	21,226	+3,000	24,226
Carbon dioxide	13,383	13,080	0	13,080
Program direction	3,487	3,600	0	3,600
Subtotal, operating expenses	179,660	175,300	+4,000	179,300
Capital equipment	7,936	7,750	0	7,750

BIOLOGICAL AND ENVIRONMENTAL RESEARCH—CONTINUED

[In thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes in DOE request	Total authority
Construction	3,000	3,250	0	3,250
Total program	190,596	186,300	+4,000	190,300

The Biological and Environmental Research (BER) program conducts long-term, multidisciplinary, and broadly-based research programs designed to identify, before a technology is locked into place, the early and late effects on human health and the environment. This program provides, through basic and applied research, sound scientific data required to reduce the health and environmental uncertainties associated with energy technology and weapons development. Some of the issues addressed under this program are the potential environmental effects of acid rain and the increase in atmospheric carbon dioxide (the "greenhouse effect") and the health consequences of exposure to nuclear radiation and chemical mixtures. The program was also established to develop new applications of nuclear science and technology for use in the diagnosis and treatment of human diseases.

The BER program is the only long-term, nation-wide research effort specifically focused on energy-related health and environmental issues. The program is divided into several subprograms, described below:

1. Source and dose determination.—The objective of the source and dose determination research program is to assess the human or ecosystem exposure that may result from the operation of current or future energy technologies. Recently this program, in conjunction with the Department's conservation program, has addressed health issues associated with exposure to radon and radon daughters in the indoor air environment. In addition, research is conducted to improve techniques for the direct measurement of human exposure to ionizing radiation or to energy-related chemicals. In FY 1986, emphasis will be placed on the dosimetry of mixed neutron-gamma fields (especially for application to occupational exposures), and on improved personnel field monitoring systems for determination of exposure to organics and other chemical materials related to emerging non-nuclear energy technologies. Advanced and innovative measurement tools and techniques required to address a broad range of human and ecological health effects problems related to energy technologies are developed within this program.

2. Environmental processes and effects.—This program is designed to anticipate environmental impacts of energy activities, to understand processes of existing or past environmental stresses sufficiently to determine their effects, and to propose ways to prevent or overcome deleterious impacts on the environment. Atmospheric, terrestrial and aquatic research are included in this program in order to determine the pathways and mechanisms whereby energy-related agents move through the environment; such information is

critical for understanding the environmental impact of acid rain. In FY 1986 emphasis is being placed on subsurface transport studies of trace metals, organics and radionuclides.

3. Health effects.—The objective of this research program is to increase understanding of human health risks that may result from exposures to ionizing radiation or to energy-related chemicals. Since the most common human exposures are of the chronic, low-dose type, this program emphasizes research on cancer, heritable defects that are transmissible to offspring, and other delayed or late-occurring health effects that may be associated with such exposures.

COMMITTEE VIEW

The Committee commends DOE for placing additional attention on the chemical and biological interactions that can modify the effects of toxic chemicals when they exist as components of complex mixtures. An understanding of the effects of chemicals contained in complex mixtures is particularly important because most human exposures to environmental chemicals involve such mixtures.

COMMITTEE ACTION

The Committee recommends that the Health Effects program be funded at $63.091 million, which is $1 million above the Administration's request. These additional funds are intended for research on the identification of risk and probability of cancer causation from exposure to radiation and chemical agents.

4. Basic biology.—The objectives of the basic biology research program are to provide fundamental information on biological structure and function and to develop an understanding of the biological mechanisms which underlie the human health effects of radiation and energy-related chemicals. In FY 1986, a segment of this research program will focus on identification of factors involved in transformation of normal cells to a malignant state.

5. Nuclear medicine.—The objective of nuclear medicine research is to conduct research and development on the use of radiation and radionuclides for medical diagnosis and treatment of human disease. The Department of Energy's facilities for conducting research in this area are unique within the Federal government.

The DOE Nuclear Medicine program has, over the years, provided information which has led to widespread use of radioisotopes for improved diagnosis and treatment of human diseases. Recent innovations and breakthrough research in radiopharmaceutical development and imaging instrumentation have opened avenues of diagnosis and treatment that would otherwise not have been available. These breakthroughs in nuclear medicine will have a significant impact on the diagnosis, treatment and prevention of human disease.

COMMITTEE ACTION

The Committee recommends that this program be funded at $24.226 million, which is $3 million above the Administration's request. These additional funds are required for continuation of re-

search and treatment of brain and heart disorders through heavy ion therapy research and development of increased imaging resolution for positron emission tomography.

6. Carbon dioxide research.—This program is designed to improve the understanding of the fundamental scientific relationships between carbon dioxide concentration and climate to aid in energy policy decisions. Improved measurements and the development of reliable models will allow questions about the relationships between future atmospheric levels of carbon dioxide, the magnitude of climate change and the responses of crops and ecosystems to higher carbon dioxide levels to be answered with confidence. During FY 1986, considerable effort will be applied to refining and redefining program needs for the next decade based on State-of-the-Art reports and the Statement of Findings report to be published in FY 1985.

7. Program direction.—This program includes salaries, benefits, travel and related personnel costs for 53 full-time equivalent employees.

8. Capital equipment.—The capital equipment requested for the Biological and Environmental Research program supports facility operations. The equipment is utilized in areas of research on health and environmental issues associated with energy technologies and on research and advances in the development of nuclear medicine technology.

9. Construction.—Construction funds for the Biological and Environmental Research are requested in support of the program's general plant project needs and the Pacific Northwest Laboratory Landlord responsibility (project number 85-R-800).

Renovation of the environmental facilities to retain animal care certification is a major priority in FY 1986 because experimental animals are required for multi-year studies of the biological effects of radiation and energy-related chemicals. Both Oak Ridge National Laboratory and Los Alamos National Laboratory were placed on probationary status by the American Association for Accreditation of Laboratory Animal Care.

LIQUEFIED GASEOUS FUELS SPILL TEST FACILITY

[in thousands of dollars]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Liquefied gaseous fuels spill test facility	2,000	1,750	0	1,750
Total program	2,000	1,750	0	1,750

The Liquefied Gaseous Fuels Spill Test Facility is a unique facility designed for conducting spill tests of liquefied gaseous fuels and other hazardous chemicals. This program was established to develop information needed by industry, regulatory agencies, and the general public on the potential hazards of these materials during handling, shipping, and storage. The dispersion and combustion of gaseous materials accidentially released into the environment will

be studied and a technical data base of safety and environmentally-related control information will be developed at this facility. Construction of the facility at the Nevada Test Site will be complete this Fall and the facility will then be made available on a user-free basis.

D. Geothermal Resources Development Fund

The goal of the Geothermal Resources Development Fund is to minimize the financial risk associated with early geothermal projects so that private sector credit can be made available. Further, the program strives to develop normal borrow-lender relationships which will provide financing of geothermal projects without direct Federal assistance.

The Geothermal Loan Guarantee Program is authorized under Title II of the Geothermal Energy Research, Development and Demonstration Act of 1974 (P.L. 93–410), as amended by Title V of the Department of Energy Act of 1978-Civilian Applications (P.L. 95–238) and Title VI of the Energy Security Act of 1980 (P.L. 96–294).

The Department's fiscal year 1986 request for managing the fund is $72,000.

COMMITTEE ACTION

No change.

E. General Science and Research

[In thousands of dollars]

General science and research	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE request	Change to DOE request	Recommendations
Operating expenses:				
High energy physics	372,929	391,500	0	391,500
Nuclear physics	146,863	151,900	0	151,900
Program direction	2,175	2,400	0	2,400
Subtotal, operating expenses	521,967	545,800	0	545,800
Capital equipment:				
High energy physics	58,700	63,100	+10,000	73,100
Nuclear physics	12,700	14,000	0	14,000
Subtotal, capital equipment	71,400	77,100	+10,000	87,100
Construction:				
High energy physics	114,000	55,500	0	55,500
Nuclear physics	23,300	7,000	0	7,000
Subtotal, construction	137,300	62,500	0	62,500
Subtotal, general sciences	730,667	685,400	+10,000	695,400
Savings from fiscal year 1984 management initiatives	−700	0	0	0
General reduction	0	0	−10,000	−10,000
Total, general science and research	729,967	685,400	0	685,400

The Department's General Science and Research programs are organized into two interrelated programs, High Energy Physics and Nuclear Physics. The salaries, benefits and associated costs of the staff of these two programs are also included in this budget category as a separate program, called General Science Program Direction. The fiscal year 1986 request for General Science and Research is $685.4 million, a decrease of $44.567 million from the fiscal year 1985 appropriation of $729.967 million. This request includes $545.8 million in operating expenses (an increase of $23.8 million from the fiscal year 1985 appropriation of $522 million), $77.1 million for capital equipment (an increase of $5.7 million from the fiscal year 1985 appropriation of $71.4 million), and $62.5 million for construction (a decrease of $74.8 million from the fisal year appropriation of $137.3 million).

SUMMARY OF COMMITTEE ACTIONS

The Committee recommendations authorize a total of $685,400,000 for General Science and Research, which is the Department's request.

In the specific subprograms, the Committee recommendations resulting in funding changes are as follows:

PLANT AND CAPITAL EQUIPMENT

High energy physics.—Increase of $10,000,000 to maintain fiscal year 1989 on-line schedules for the D-Zero detector at the Fermi National Accelerator Laboratory and the Stanford Linear Detector at the Stanford Linear Accelerator Center.

GENERAL REDUCTION

A general reduction of $10,000,000 to be applied across General Science and Research programs with the proviso that there be no further reduction in high energy or nuclear physics facility utilization.

1. HIGH ENERGY PHYSICS

The High Energy Physics program supports basic research which seeks to discover the fundamental constituents of matter and to understand the laws of nature that govern the fundamental behavior of energy and matter. Advancement in high energy physics is dependent on the availability of large, complex particle accelerator and colliding beam facilities, as well as on the sophisticated detectors that record the effects of particle collisions. The experimental work is carried out primarily on the high energy accelerator and colliding beam facilities operated by the DOE: (1) the 30 GeV (billion electron volts) proton synchrotron, called the Alternating Gradient Synchroton (AGS) at Brookhaven National Laboratory (BNL); (2) the 1,000 GeV superconducting magnet proton synchroton at Fermi National Accelerator Laboratory (Fermilab); and (3) the 32 GeV linear electron accelerator at the Stanford Linear Accelerator Center (SLAC). SLAC also has two electron-positron colliding beam facilities for which the linear accelerator acts as the injector: the

Stanford Positron-Electron Asymmetric Ring (SPEAR) (4 GeV × 4 GeV) and the Positron-Electron Project (PEP) (15 GeV × 15 GeV).

Three new facilities are under construction: the Tevatron I and Tevatron II at Fermilab, and the Stanford Linear Collider (SLC) at SLAC. Tevatron I, scheduled for completion late in fiscal year 1986, permits acceleration of protons and antiprotons to 1,000 GeV and will provide a facility for proton-antiproton collisions at 2,000 GeV. Tevatron II, scheduled for completion at the end of fiscal year 1985, will provide a number of new and secondary beam enclosures and experimental halls for fixed target experiments. The goals of the SLC are (1) to develop and demonstrate the feasibility of using linear colliders to extend electron-positron reaction energies in a cost effective way beyond the maximum that is practical for circular colliders; and (2) to provide the world's earliest access to electron-positron colliding beams of energies of 100 GeV in the center-of-mass, and the anticipated copious production of the Z° boson.

The fiscal year 1986 budget request for High Energy Physics totals $510.1 million, a decrease of $35.5 million from the fiscal year 1985 appropriation of $545.6 million, and includes $391.5 million in operating expenses, $63.1 million in capital equipment, and $55.5 million in construction.

COMMITTEE VIEWS

Superconducting super collider [SSC].—In July 1983, the Department's High Energy Physics Advisory Panel (HEPAP) unanimously endorsed the construction of a high-luminosity proton-proton accelerator called the Superconducting Super Collider (SSC). The Committee has supported preliminary R&D on the SSC beginning in fiscal year 1984 and continues to support the project's Phase I activities in fiscal year 1986. However, there are several areas of concern which the Committee expects to have addressed if support is to continue in the future.

The Committee recognizes the enthusiasm for the SSC among the U.S. high energy physics community. There is no doubt that the SSC, if successfully constructed and operated as anticipated, would be the most powerful high energy facility of the world. The Committee wants to emphasize, however, that the basic issue facing the SSC for the next several years is not when and where the SSC will be built; rather the issue is whether or not the SSC should be built.

Key to addressing the issue of whether or not to build the SSC is its cost. Of particular concern is the magnet system which could require several thousands of magnets costing well in excess of $1 billion. The Fermilab experience shows that many problems are not uncovered until a hundred or more magnets are manufactured in a production environment. Often problems not previously encountered are revealed by testing long strings of magnets. However, it is apparent that neither the funding nor the time scale presently envisioned will be adequate to carry out the necessary activities to give confidence in the cost estimates of the magnet system if the SSC is submitted in the fiscal year 1988 budget submission. There are also many other system and subsystem issues which must be addressed within limited funding and timing constraints. Conse-

quently, the Committee urges the Department to reconsider the planned fiscal year 1988 submission date for the SSC construction project. Prior to considering any formal proposal from the Department, the Committee would insist that the Phase I activities will produce: (1) a fully costed detailed design of the SSC; (2) studies and tests to ensure engineering feasibility; (3) a detailed cost development plan, showing the time-scale and resources required to construct the SSC, with a planning schedule for the various stages of supply, construction, tests and start-up of the facility; and (4) an independent assessment of the foregoing.

The Committee is also concerned about the lack of industrial and foreign participation in the project even at this early date. Industry should be utilized to the maximum extent possible, particularly with regard to systems engineering and manufacturing issues. In addition, because of the very high preliminary cost estimates of the SSC as well as the formidable technical challenges, the Department should seek, at as early a time as possible, international cooperative participation and funding.

Finally, the Committee notes that the long time frame of well over a decade during which the SSC will be developed and constructed mandates greater long-term stability for the U.S. program. Very careful planning is necessary so as not to repeat mistakes of the past and to improve the possibility of achieving coordination with international research activities. Accordingly, the Committee urges that the U.S. high energy physics program strive for greater continuity and stability.

Alternating gradient synchrotron.—For over two decades, the Alternating Gradient Synchrotron (AGS) has produced a remarkable flow of good physics results, including several Nobel Prize experiments. The Committee is impressed with the proposed booster upgrade of the AGS. This upgrade, for a modest cost of less than $25 million over three years, would enhance both the broad range of currently approved AGS high energy physics experiments as well as the heavy ion physics capability at Brookhaven National Laboratory. The Department is urged to give this proposal strong consideration in its fiscal year 1987 budget deliberations.

COMMITTEE ACTION

Capital equipment.—The Tevatron I proton-antiproton colliding beam facility at Fermilab and the SLC electron-positron colliding beam facility at SLAC, to be completed in fiscal year 1986, will be the highest energy facilities of their respective types in the world. These two projects, along with Energy Saver project completed at Fermilab in fiscal year 1982, represent an investment of over $250 million in construction costs alone since fiscal year 1979, and nearly $400 million of associated project R&D activities are included. However, neither of these forefront accelerator facilities will be equipped with the complement of detectors required to properly explore the broad spectrum of scientific research made possible by the new energy regimes opened with their completion. While both Fermilab and SLAC will have detector facilities in place at the beginning of the operations of their respective machines, more power-

ful detectors should be ready by the end of the decade to fully exploit the potential of the Tevatron I and the SLC.

A start has been made on new detector devices (the D-Zero detector at Fermilab and the SLD at SLAC), but the capital equipment funds available in the fiscal year 1986 budget request are not sufficient to meet the other minimal requirements of the High Energy Physics program and to keep these new detectors on schedule. Recognizing the importance of these detectors, the Committee directs an increase of $10.0 million in High Energy Physics capital equipment to maintain the schedule of the detectors and expects that, in subsequent fiscal years, the Department will provide sufficient funding to complete these detectors in fiscal year 1989. To accommodate this addition of capital equipment funding and to maintain the Department's overall request in the General Science and Research program, the Committee recommends a general reduction of $10.0 million in these programs with the proviso that there be no further reduction in high energy or nuclear physics facility utilization.

DETAILED SUMMARY

Details of the Committee's recommendations, current year estimates and the budget request are shown on the following tables:

[In thousands of dollars]

General science and research	Fiscal year—		Committee action	
	Estimated 1985	1986 DOE request	Change to DOE request	Recommendations
HIGH ENERGY PHYSICS				
Operating expenses:				
Physics research	107,494	111,300	0	111,300
Facility operations	175,235	187,800	0	187,800
High energy technology	90,200	92,400	0	92,400
Subtotal, operating expenses	372,929	391,500	0	391,500
Capital equipment	58,700	63,100	+10,000	73,100
Construction:				
81-E-218, Tevatron I, Fermilab	21,300	8,600	0	8,600
84-ER-133, Stanford Linear Accelerator Center Linear Collider [SLC]	60,500	22,900	0	22,900
86-R-102, Accelerator improvements and modifications, various locations	0	10,500	0	10,500
86-R-103, General plant projects, various locations	0	10,400	0	10,400
86-R-104, Central computing upgrade, Fermilab	0	3,100	0	3,100
Total, construction	114,000	55,500	0	55,500
Total, high energy physics	545,629	510,100	+10,000	520,100

2. NUCLEAR PHYSICS

The Nuclear Physics program supports experimental and theoretical investigations in order to gain a better understanding of the structure and properties of the atomic nuclei and the forces that govern their behavior. Nuclear physics, like high energy physics,

makes use of advanced particle accelerator facilities. Seven existing accelerator facilities are operated as national facilities whose beam times are made available to all the Nation's scientists on the basis of scientific merit and technical feasibility: (1) the Clinton P. Anderson Meson Physics Facility (LAMPF) at Los Alamos National Laboratory (LANL); (2) the William H. Bates Linear Accelerator Center at the Massachusetts Institute of Technology (MIT); (3) the SuperHILAC/Bevalac at Lawrence Berkeley Laboratory (LBL); (4) the Holifield Heavy Ion Research Facility at Oak Ridge National Laboratory (ORNL); the 88-Inch Cyclotron at LBL; (6) the Tandem/Linac Facility at Argonne National Laboratory (ANL); and (7) the Double MP Tendem Van de Graaff facility at Brookhaven National Laboratory (BNL). To complement these national facilities, the program also supports dedicated on-campus accelerators at Yale University, Duke University, the University of Washington, and Texas A&M University. In addition, the new injector at the Stanford Linear Accelerator (SLAC) is now operational and serves the nation's scientists on the same basis as a national facility.

The fiscal year 1986 budget request for Nuclear Physics totals $172.9 million, a decrease of $10.0 million from the fiscal year 1985 appropriation of $182.9 million, which includes an additional $3.1 million provided under Defense Programs for LAMPF facility operations in fiscal year 1985.

COMMITTEE VIEWS

LAMPF.—Since LAMPF supplies proton beams, not only for Nuclear Physics research, but also for Defense Programs' and Basic Energy Sciences' activities, proper accounting for LAMPF operations is complicated. In the past, shortfalls in LAMPF operations funding have been corrected by redirecting appropriated funds from Defense Programs. The Committee is pleased that the Director of the Office of Energy Research and the Assistant Secretary for Defense Programs have agreed to budget all LAMPF operations in Nuclear Physics. The Committee expects this arrangement will continue in the future.

CEBAF.—The Committee strongly supports the Department's request for funding of the Continuous Electron Beam Accelerator Facility (CEBAF). This project is the highest priority of the nuclear physics community, and is essential to maintain this nation's leadership in nuclear physics. In order that the project may proceed on a timely basis, the Department is directed to expedite the preparation and submission to Congress of a reliable construction schedule and associated cost estimates for the project. Such cost estimates shall include all supporting facilities, and collateral equipment unique to the special nature of the accelerator building.

DETAILED SUMMARY

Details of the Committee's recommendations, current year estimates and the budget request are shown on the following tables:

[In thousands of dollars]

General science and research	Fiscal year—		Committee action	
	Estimate 1985	1986 DOE request	Change to DOE request	Recommendations
NUCLEAR PHYSICS				
Low energy nuclear physics	13,500	13,400	0	13,400
Medium energy nulear physics	[1] 74,615	76,450	0	76,450
Heavy ion nuclear physics	49,448	52,650	0	52,650
Nuclear theory	9,300	9,400	0	9,400
Subtotal, operating expenses	146,863	151,900	0	151,900
Capital equipment	12,700	14,000	0	14,000
Construction:				
86–R–204 Accelerator improvements and modifications, various locations	[2] 0	3,500	0	3,500
86–R–205 General plant projects, various locations	[3] 0	3,500	0	3,500
Subtotal, construction	0	7,000	0	7,000
Total, nuclear physics	182,863	172,900	0	172,900

[1] Includes $3.1 million defense programs support of LAMPF operations.
[2] $3.5 million appropriated for AIP in fiscal year 1985 (85–R–200).
[3] $3.5 million appropriated for GPP in fiscal year 1985 (85–R–201).

GENERAL SCIENCE AND RESEARCH—GENERAL REDUCTION

The Committee directs the Department to apply a general reduction of $10,000,000 across the General Science and Research programs (i.e., High Energy and Nuclear Physics) to maintain the fiscal year 1986 request level of $685,400,000. This general reduction may be applied at the Department's discretion to assure that the funds not explicitly identified by the Committee may be used for the remaining highest priority programs with the exception that this reduction shall not be applied to reduce the planned utilization level of any high energy or nuclear physics facility.

F. Uranium Enrichment R&D

[Dollars in thousands]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Advanced gas centrifuge [AGC] operations and support	71,000	TBD		TBD
Atomic vapor laser isotope separation [AVLIS]	69,800	TBD		TBD
Advanced technology reserve	10,000	0		0
Subtotal, operating	150,800	150,000		150,000
Capital equipment:				
Advanced gas centrifuge [AGC] operations and support	1,000	TBD		TBD
Atomic vapor laser isotope separation [AVLIS]	7,700	TBD		TBD
Subtotal, capital equipment	8,700	TBD		TBD

[Dollars in thousands]

	Fiscal year—		Committee action	
	1985 budget authority (estimate)	1986 DOE request	Changes to DOE request	Total authorization
Construction:				
AVLIS 85–N–501 GPP, various locations	500	0		0
Subtotal, construction	500	0		0
Total	160,000	150,000		150,000

ADVANCED GAS CENTRIFUGE AND ATOMIC VAPOR LASER ISOTOPE SEPARATION

The goals of the advanced gas centrifuge process development and demonstration program are to demonstrate the gas centrifuge technology required for the Gas Centrifuge Enrichment Plant, and to develop economic and technical data on advanced gas centrifuges in support of the FY 1985 technology decision. The requested funding provides for the continuation of basic development tasks; continued operation of existing Set V test facilities; and development of materials and processes for improving centrifuge separative performance.

The goal of the Atomic Vapor Laser Isotope Separation (AVLIS) program is to develop a technology which will provide for the production of enriched uranium at significantly reduced cost, and to provide economic and technical data in support of the FY 1985 technology decision.

The Committee directs that the losing technology be funded at a meaningful level to ensure its availability in the event that the winning technology is not successfully demonstrated.

COMMITTEE ACTION

No change.

COMMITTEE VIEW

Uranium enrichment R&D

The Committee continues to support a May selection date for an advanced technology to serve as the focus of the Department's research and development program. The Committee notes that the Department has recognized the Committee's concern over the anticipated lack of detailed data to reach a deployment decision by May, 1985 on the selected technology. The Committee concurs that additional data is necessary for such a deployment decision and supports the Department in its plan to continue an expedited demonstration effort beyond the May decision date.

The Committee has concluded that there remains a measurable risk, independent of the technology chosen, that the selected technology will not meet cost and performance projections. The Committee therefore directs the Department to fund the losing technology at a level sufficient to ensure that it is a viable back-up.

The Committee believes that a funding level between $30 and $40 million should be sustained for the back-up technology.

G. Energy Facilities

COMMITTEE VIEW

For plant and capital equipment and other facilities related to civilian research and development activities

The Department of Energy has advised the Committee that the total replacement value of its existing facilities and equipment exceeds $26 billion and that the value of those facilities at multiprogram sites under Committee jurisdiction is over $6.5 billion. However, specific requests for operation, maintenance, and rehabilitation are not adequate to support that $6.5 billion investment. Further, it appears to the Committee that prudent procurement practices, including design and construction, are not continually exercised. The Department claims to have a system and method for procurement, care and upkeep. The Committee therefore intends to carry out an extensive oversight investigation of the Department's facilities management in the current calandar year to evaluate that system. The Committee also reiterates its concern of several years ago that no central entity exists in DOE to exercise overall facilities control and oversight.

V. RESEARCH AND DEVELOPMENT—FISCAL YEARS 1987 AND 1988

SUMMARY OF COMMITTEE ACTIONS

[In thousands of dollars]

	Fiscal year 1986 DOE request	Fiscal year 1986 Committee action	Fiscal year 1987 Committee action	Fiscal year 1988 Committee action
Fossil energy:				
Operating and capital equipment			348,556	366,297
Construction			4,156	4,368
Total	242,671	323,171	352,712	370,665
Energy conservation:				
Operating and capital equipment			165,163	168,578
Construction			0	0
Total	129,775	155,275	165,163	168,578
ENERGY SUPPLY R&D				
Solar energy:				
Operating and capital equipment			152,945	161,785
Construction			0	0
Total	144,932	148,432	152.945	161,785
Geothermal energy:				
Operating and capital equipment			26,517	28,052
Construction			0	0
Total	25,200	25,200	26,517	28,052

[In thousands of dollars]

	Fiscal year 1986 DOE request	Fiscal year 1986 Committee action	Fiscal year 1987 Committee action	Fiscal year 1988 Committee action
Nuclear fission:				
Operating and capital equipment			470,750	494,300
Construction			8,400	10,800
Total	419,325	458,440	479,150	505,100
Magnetic fusion energy:				
Operating and capital equipment			417,950	438,850
Construction			10,000	10,000
Total	390,000	415,000	427,950	448,850
Electric energy systems and energy storage systems:				
Operating and capital equipment, total	26,100	36,813	36,186	39,046
Supporting research and technical analysis:				
Operating and capital equipment			437,831	462,709
Construction			58,202	12,200
Total	481,300	481,300	496,033	474,909
Environmental R&D:				
Operating and capital equipment			239,785	251,765
Construction			3,250	3,250
Total	227,616	231,616	243,035	255,015
Subtotal, energy supply R&D:				
Operating and capital equipment			1,782,964	1,876,507
Construction			79,852	36,250
Total	1,714,473	1,796,801	1,862,816	1,912,757
Geothermal resources development fund (GRDF):				
Operating expenses, total	72	72	75	78
General science and research:				
Operating and capital equipment			660,061	687,887
Construction			47,500	33,900
Total	685,400	685,400	707,561	721,787
Uranium enrichment R&D:				
Operating and capital equipment			156,000	163,800
Construction			0	0
Total	150,000	150,000	156,000	163,800
Total	2,922,391	3,110,719	3,244,327	3,337,665

COMMITTEE ACTION

The Committee has recommended authorizations for fiscal years 1987 and 1988, as well as for fiscal year 1986. These authorizations assume current programs continuing through the period, and no significant new starts.

Where changes were made from the Department's request for a particular program for fiscal year 1986, the resulting change was included in future years to arrive at the outyear authorizations. It is assumed that projects considered and approved in previous

years, as well as projects approved in fiscal year 1986, will be continued within the funding proposed for fiscal years 1987 and 1988.

Additional authorization for these items and new starts that may be added in outyear budgets will be considered as amendments to the basic authorization.

Following is additional information relating to the specific programs:

FOSSIL, CONSERVATION, SOLAR, AND GEOTHERMAL ENERGY

[In thousands of dollars]

	Fiscal year—					
	1986		1987		1988	
	DOE request	Recommendation	Projection	Recommendation	Projection	Recommendation
Fossil energy:						
Operating expenses [1]	[2] 235,686	[2] 316,186	[3] 261,465	[3] 345,427	274,774	363,009
Capital equipment [4]	3,000	3,000	3,129	3,129	3,288	3,288
Construction [4]	3,985	3,985	4,156	4,156	4,368	4,368
Total, fossil energy	242,671	323,171	268,750	352,712	282,430	370,665
Conservation, total	129,775	155,275		165,163		168,578
Included in the Committee's recommendation for out-year funding for the conservation program, is authorization for the completion of the Stirling (MOD II) engine project.						
Solar energy:						
R&D programs:						
Operating expenses:	139,150	142,650	146,455	149,087	154,994	157,778
Capital equipment	3,711	3,711	3,858	3,858	4,007	4,007
Construction	2,071	2,071	2,153	0	2,236	0
Total, solar energy	144,932	148,432	152,466	152,945	161,237	161,785
Geothermal energy:						
Operating expenses	24,700	24,700	25,997	25,997	27,512	27,512
Capital equipment	500	500	520	520	540	540
Total, geothermal energy	25,200	25,200	26,517	26,517	28,052	28,052

[1] Fiscal year 1987 and fiscal year 1988 Projections and recommendations for operating expenses use CBO inflation rates of 4.1 percent for fiscal year 1987 and 4.0 percent for fiscal year 1988.

[2] Fiscal year 1986 Operating expenses do not reflect $15.0 previous appropriation for TVA demonstration plant.

[3] Base includes previous appropriation of $15.0 for TVA demonstration plant.

[4] Fiscal year 1987 and fiscal year 1988 Projections and recommendations for construction and capital equipment use CBO inflation rates of 5.3 percent for fiscal year 1987 and 5.8 percent for fiscal year 1988.

NUCLEAR FISSION R&D, MAGNETIC FUSION ENERGY, ELECTRIC ENERGY SYSTEMS AND ENERGY STORAGE SYSTEMS

The Committee recommendation for outyear funding for the Nuclear Fission R&D, Magnetic Fusion Energy, Electric Energy Systems and Energy Storage Systems programs provides for increases for inflation for operating expenses and capital equipment not related to construction at the rates of 4% for FY 1987 and 5% for FY 1988. The recommendation also provides for ongoing construction projects as well as general plant projects and modifications to reactors.

SUPPORTING RESEARCH

[In thousands of dollars]

	Fiscal year—					
	1986		1987		1988	
	DOE request	Recommendation	Projection	Recommendation	Projection	Recommendation
Supporting research and technical analysis:						
Operating expenses	376,381	384,881	396,141	405,087	419,236	428,704
Capital equipment	31,494	31,494	32,744	32,744	34,005	34,005
Construction:						
Basic energy sciences:						
Line item construction [1]	29,100	29,600	10,260	24,760	1,200	4,600
Accelerator improvement projects	2,995	2,995	3,100	3,100	3,200	3,200
General plant projects	4,030	4,030	4,200	4,200	4,400	4,400
Subtotal, BES construction	36,125	36,625	17,560	32,060	8,800	12,200
Multiprogram laboratories facilities support:						
Line item construction	37,300	37,300	26,142	26,142	0	0
Subtotal, supporting research construction	73,425	73,925	43,702	58,202	8,800	12,200
General reduction	0	−9,000	0	0	0	0
Total, supporting research	481,300	481,300	472,587	496,033	462,041	474,909

[1] For line item construction projects the fiscal year 1986 DOE request was used as basis for fiscal year 1987 and fiscal year 1988 projections and recommendations.

ENVIRONMENTAL R&D

The Committee recommendation for outyear funding provides for a continuing program with modest increases for inflation.

GRDF AND GENERAL SCIENCE AND RESEARCH

[In thousands of dollars]

	Fiscal year—					
	1986		1987		1988	
	DOE request	Recommendation	Projection	Recommendation	Projection	Recommendation
Geothermal resources development fund:						
Operating expenses	72	72	75	75	78	78
General science and research.						
Operating expenses	545,800	545,800	568,302	568,302	590,804	590,804
Capital equipment	77,100	87,100	81,224	91,759	85,937	97,083
Construction:						
High energy physics:						
Line item construction	34,600	34,600	18,000	18,000	2,800	2,800
Accelerator improvement projects	10,500	10,500	11,100	11,100	11,700	11,700
General plant projects	10,400	10,400	11,000	11,000	11,600	11,600
Subtotal, HEP construction	55,500	55,500	40,100	40,100	26,100	26,100
Nuclear physics:						
Accelerator improvement projects	3,500	3,500	3,700	3,700	3,900	3,900
General plant projects	3,500	3,500	3,700	3,700	3,900	3,900
Subtotal, NP construction	7,000	7,000	7,400	7,400	7,800	7,800

GRDF AND GENERAL SCIENCE AND RESEARCH—Continued

[In thousands of dollars]

	Fiscal year—					
	1986		1987		1988	
	DOE request	Recommendation	Projection	Recommendation	Projection	Recommendation
Subtotal general science construction	62,500	62,500	47,500	47,500	33,900	33,900
General reduction	0	−10,000	0	0	0	0
Total, general science and research	685,400	685,400	697,026	707,561	710,641	721,787

URANIUM ENRICHMENT R&D

The Committee recommendation for outyear funding provides for increases for inflation for operating expenses and capital equipment not related to construction at the rates of 4 percent for fiscal year 1987 and 5 percent for fiscal year 1988.

VI. EFFECT OF LEGISLATION ON INFLATION

In accordance with Rule XI, Clause 2(l)(4), of the Rules of the House of Representatives, the following is a statement concerning the inflationary impact of H.R. 1798.

H.R. 1798 is assessed to have no significant inflationary effect on prices and costs in the operation of the national economy.

VII. COMMITTEE OVERSIGHT FINDINGS AND RECOMMENDATIONS

Pursuant to Rule XI, Clause 2(l)(3), of the Rules of the House of Representatives, and under the authority of Rule X, Clause 2(b)(1) and Clause 3(f), the results and findings from the Committee's oversight activities are incorporated in the recommendations found in the present bill and report.

VIII. SUMMARY OF GOVERNMENT OPERATIONS COMMITTEE FINDINGS AND RECOMMENDATIONS

No findings and recommendations on oversight activity pursuant to Rule X, Clause 4(C)(2), and Rule XI, Clause 2(l)(3), of the Rules of the House of Representatives, have been submitted by the Committee on Government Operations for inclusion in this report.

IX. BUDGET ANALYSIS AND PROJECTION—CONGRESSIONAL BUDGET ACT INFORMATION

This bill provides for new authorization rather than new budget authority and consequently the provisions of section 308(a) of the Congressional Budget Act of 1974 are not applicable.

X. CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, April 17, 1985.

Hon. DON FUQUA,
Chairman, Committee on Science and Technology,
House of Representatives, Washington, DC.

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the attached revised cost estimate for H.R. 1798, the Department of Energy Civilian Research and Development Act for Fiscal Years 1986, 1987, and 1988.

If you wish further details on this estimate, we will be pleased to provide them.

With best wishes,
Sincerely,

RUDOLPH G. PENNER.

CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

1. Bill number: H.R. 1798.

2. Bill title: Department of Energy Civilian Research and Development Act for Fiscal Years 1986, 1987, and 1988.

3. Bill status: As ordered reported by the House Committee on Science and Technology, April 2, 1985.

4. Bill purpose: The bill authorizes the appropriation of $3,111 million for 1986, $3,244 million for 1987, and $3,338 million for 1988 for civilian research and development programs of the Department of Energy (DOE). The authorization includes funds for research in solar, fossil, nuclear, and other energy technologies. The authorized amounts for 1986 are $188 million above the President's request for 1986 and $120 million below the 1985 appropriations.

5. Estimated cost to the Federal Government:

[By fiscal years, in millions of dollars]

	1986	1987	1988	1989	1990
Authorization level	3,111	3,244	3,338	.....	.....
Estimated outlays	1,626	2,809	3,277	1,579	393

The costs of this bill fall within budget functions 250 and 270.

Basis of estimate: CBO assumes that all amounts authorized will be appropriated and that spending will occur at historical rates.

6. Estimated cost to State and local governments: None.

7. Estimate comparison: None.

8. Previous CBO estimate: On April 17, 1985, the Congressional Budget Office prepared a cost estimate for H.R. 1799, which also authorizes funding for DOE programs. The amounts in Titles I and II of that bill are equal to the amounts authorized by H.R. 1798.

This estimate supersedes CBO's previous estimate for H.R. 1798, prepared on April 11, 1985. The estimated budget impact is the same as in the previous estimate, but the amount of the corresponding 1985 appropriations has been revised.

9. Estimate prepared by: Pete Fontaine, Kathy Gramp, and Paul DiNardo.

10. Estimate approved by: C.G. Nuckols (for James L. Blum, Assistant Director for Budget Analysis).

XI. CHANGES IN EXISTING LAW MADE BY THE BILL AS REPORTED

In compliance with Rule XIII, Clause 3 of the Rules of the House of Representatives, there are no changes in existing law made by the bill, as reported.

XII. COMMITTEE RECOMMENDATIONS

A quorum being present, the bill H.R. 1798 was ordered reported on April 2, 1985 by the Committee by a voice vote.

XIII. ADDITIONAL AND DISSENTING VIEWS

ADDITIONAL VIEWS OF CONGRESSMEN DOUG WALGREN, RICHARD H. STALLINGS, DON RITTER, JIM TRAFICANT, AND HARRIS W. FAWELL TO ACCOMPANY THE REPORT ON H.R. 1798, THE DEPARTMENT OF ENERGY CIVILIAN RESEARCH AND DEVELOPMENT BILL

A nation without a strong steel industry cannot survive as an independent nation. Steel is basic to the economy and the defense of our country. Yet the American steel industry in the 1970s and 1980s lost its technological advantage which provided the foundation for our competitiveness in the two decades following World War II.

We are pleased that the Science and Technology Committee agreed to the chairman's and Mr. Walgren's initiative to provide $6 million for steel technology research in the national laboratories in cooperation with the industry and our universities.

An Industry Battered by Many Currents

The industry has been caught in a vicious cycle of weak demand, poor profitablity, lagging investment, high costs, and technological advancement abroad. In the 1980s, the industry was hit with the "double whammy" of the 1982 recession and subsidized imports flowing into our ports at levels as high as 33%. Steel jobs have been cut in half.

Many Disparate, Few Coherent Efforts

There have been several efforts to help the industry. In 1981, Congress gave the steel industry a three-year extension to meet its clean air deadlines. In enacting the Omnibus Trade Act of 1984, Congress tied the President's enforcement authority for bilateral trade agreements to an industry commitment to reinvest its net cash flow in moderization. Rejecting pleas from Congress, industry and labor for quotas, the Administration has begun to negotiate import limits with a number of foreign countries.

The President reconstituted the government-labor-industry "tripartite" committee, formed during the Carter Administration, and this Steel Advisory Committee issued its report in November 1984.

Study after study has emphasized the need for the industry to modernize. In the words of the Office of Technology Assessment, "The trend of improving and changing technology is necessary to maintain competitiveness, improve profitability, and improve product quality and innovations." Commendably, the steel industry, despite its adversities, has put over $10 billion in capital expenditures

since 1980, much of this into modernization. Labor too has granted major concessions.

Despite these efforts, the industry is not strong enough to both meet the challenges of today and to single-handedly do the research required for long-term competitiveness.

There really has been no comprehensive, long-range federal strategy to address the underlying problems of the steel industry, unless it is a "silent strategy" of benign neglect. In our view, the longer we avoid developing such a strategy, the more it is delayed, the more radical it will have to be. The longer we neglect the problem, the more intense government involvement will be. By virtually allowing the demise of steel research and development over the past two decades, we have almost forfeited our competitiveness.

An R&D Role for Government

Government support for R&D is a crucial element of an industrial policy. Take, for example, defense policy. Government subsidizes defense industries substantially through a guaranteed return on investments, promotion of export sales, and direct subsidy for research. In aerospace, 72 percent of total research and development expenditures come from the federal government. But less than 2 percent of steel R&D expenditures are supported by the federal government.

There is a role for government. The President has certainly hinted at it. On August 30, 1984, he said, "We must maintain and increase our older industries' ability to compete in the world." On October 13, 1984, he stated, "But we can't and won't be satisfied . . . until we modernize and make our older industries more competitive with new technologies."

Steel Technology (R&D) Amendment

The steel technology initiative in this bill is an important first step toward filling that void in federal policy. Embodied in section IV. B, it would earmark $6 million in the Energy Conservation Program to begin long-term, high pay-off steel initiatives in DOE's national laboratories. It would involve scientists from government, industry, and the nation's universities. It attempts to carry out a directive of the President in an August 5, 1983 memo for heads of departments and agencies: "As we enter an era of increasing dependence on our science and technology, it is essential that we make use of our federal laboratories." Its goal is to develop new steelmaking technologies, known as "leapfrog technologies" that are less capital-intensive, more automated, and more energy efficient.

Our amendment follows through on an initiative begun with the Administration by the President's Science Advisor, Dr. G. A. Keyworth, but one that was denied by the Office of Management and Budget in the 1986 budget sent to Congress. In Dr. Keyworth's words, "We have done a poor job of harnessing our strength . . . We have to work together toward a common purpose, that of improving our industrial competitiveness abroad. We need a strong, new partnership among government, universities and industry." According to the Department of Energy, "The proposed Steel Industry/Federal Laboratory Initiative has the potential for a reduction by ⅓ of

the high energy input required for steelmaking by today's technologies and an attendant reduction in capital and operating costs targeted at 30 percent and 50 percent respectively, reflecting the inherent modularity, flexibility, product control and energy savings associated with the exploratory technologies to be addressed."

Steel industry scientists and engineers and their counterparts in the national labs have identified four areas of possible work: reduction of domestic raw material, including scrap, to liquid steel; production of near-net shape solids from liquid steel; development of universal grades of steel; and application of automatic processing technology. Our amendment is an effort to forge this partnership and to begin to fund a trilateral effort to get us on the road to a modern steel industry.

Significantly, the steel industry has agreed to commit $2.8 million in labor and services to this effort, and another $2.5 million authorization is included in H.R. 1617, the National Bureau of Standards Authorization Act of 1985. Hopefully, this $11 million is the first phase of the much larger effort needed to get the industry back on the road to revival and resurgence, to put our steel mills back into the international marketplace—and importantly, to put steelworkers back to work.

This nation has the scientific minds and the technological know-how to bring this industry back. The industry and its workers are willing to share in the task. It only takes a commitment to do so. We hope we can provide the Administration and the Congressional commitment necessary to mate our technological genius with the needs of this crucial, renewable industry.

DOUG WALGREN.
RICHARD H. STALLINGS.
DON RITTER.
JIM TRAFICANT.
HARRIS W. FAWELL.

DISSENTING VIEWS FOR DOE AUTHORIZATION BILL H.R. 1798

Most agree that the overriding domestic concern facing our country is deficit reduction and controlling government spending. But no matter how many times we reiterate our commitment to this laudable objective, it is meaningless unless our deficit reduction rhetoric is translated into concrete action.

This Committee has fallen prey to a common affliction in Congress: a reluctance to make the difficult budget reduction choices. Despite claims of fiscal responsibility, the Department of Energy FY 1986 authorizations proposed in this bill which are solely within the jurisdiction of the Science and Technology Committee are $188 million above the administration request. All four Subcommittees which have jurisdiction over the DOE research and development programs reported authorizations which exceeded the President's request.

We realize that these R&D programs are important to our country's energy security and technological progress. We further recognize that even with the almost $200 million additions contained in this authorization bill, the DOE programs remain below the 1985 appropriated levels. However, this bill sends the wrong signal by repudiating our commitment to control the enormous federal debt by cutting spending. The annual deficit will be $200 billion for as far as the eye can see unless we in Congress make the difficult choices to reduce federal spending. If we are unable in this particular authorization bill to make a budget reduction of only about $200 million—only 1/100th of the annual deficit—how can we in good conscience say that we as an institution support reducing the deficit and balancing the federal budget?

At the full Committee mark-up, we supported an amendment which would have reduced all DOE FY 1986 authorizations within the sole jurisdiction of the Science and Technology Committee by 6.1 percent so that the total funding level reported in the bill would have been equal to that requested in the President's budget. Despite our best efforts, the amendment was defeated. We sincerely hope that if a similar amendment is offered on the House floor that there will be more of us who are anxious to translate budget cutting zeal into actual action.

MANNEL LUJAN, Jr.
JAMES SENSENBRENNER, Jr
BOB WALKER.
JOE BARTON.
D. FRENCH SLAUGHTER, Jr.
BILL COBEY.
DAVID S. MONSON.
ROBERT C. SMITH.